Universidade de Lisboa

Faculdade de Motricidade Humana

Attempting and Achieving Weight Loss and Maintenance

Inês Chaparro Roque dos Santos Telo Rasquilha

Orientador: Professor Doutor Pedro Jorge do Amaral de Melo Teixeira

Tese especialmente elaborada para obtenção do grau de Doutor em Motricidade Humana na Especialidade de Atividade Física e Saúde

Júri:

Presidente

Professor Doutor Francisco José Bessone Ferreira Alves

Vogais

Professora Doutora Carla Maria de Moura Lopes

Professora Doutora Sandra Cristina Ribeiro Vaz da Silva Martins

Professora Doutora Maria Isabel Augusta Cortes do Carmo

Professor Doutor Duarte Fernando da Rosa Melo Petronilho Araújo

Professora Doutora Analiza Mónica Lopes Almeida Silva

Professor Doutor Pedro Jorge do Amaral de Melo Teixeira

O trabalho apresentado nesta dissertação foi financiado pela Fundação para a Ciência e a Tecnologia (SFRH/BD/80739/2011)

2017

Universidade de Lisboa

Faculdade de Motricidade Humana

Attempting and Achieving Weight Loss and Maintenance

Inês Chaparro Roque dos Santos Telo Rasquilha

Orientador: Professor Doutor Pedro Jorge do Amaral de Melo Teixeira

Tese especialmente elaborada para obtenção do grau de Doutor em Motricidade Humana na Especialidade de Atividade Física e Saúde

Júri:

Presidente

Professor Doutor Francisco José Bessone Ferreira Alves

Vogais

Professora Doutora Carla Maria de Moura Lopes

Professora Doutora Sandra Cristina Ribeiro Vaz da Silva Martins

Professora Doutora Maria Isabel Augusta Cortes do Carmo

Professor Doutor Duarte Fernando da Rosa Melo Petronilho Araújo

Professora Doutora Analiza Mónica Lopes Almeida Silva

Professor Doutor Pedro Jorge do Amaral de Melo Teixeira

O trabalho apresentado nesta dissertação foi financiado pela Fundação para a Ciência e a Tecnologia (SFRH/BD/80739/2011)

2017

Para a minha Mãe, Fau, Tita e Ricardo

Para os meus pequeninos, Nonoca e Miguelito

Em tua memória Pai... Apesar de ausente, estarás sempre presente

AGRADECIMENTOS

Mais um processo que chega ao fim, um capítulo que termina, um sonho que se torna realidade. E isto não teria sido possível sem o contributo de um número considerável de pessoas. A estas pessoas quero aqui expressar o meu reconhecimento. Faço questão que fique registado para que se torne memorável.

Em primeiro lugar, ao **Professor Pedro Teixeira**, "O" orientador científico (e não só!) ao longo dos últimos 5 (+1) anos. Professor, nunca poderei exprimir plenamente a minha gratidão perante a oportunidade de aprender e trabalhar consigo. Ensinou-me tanto! Cientificidades à parte, ensinou-me a apreciar um processo que muito teve de complexo, a gerir ansiedades, medos e frustrações. Ensinou-me que "a vida acontece!" e que vão sempre existir imprevistos (na ciência, na vida) com os quais teremos que aprender a lidar. O seu fascínio pela investigação, a facilidade com que comunica e o seu entusiasmo pela novidade (característica que nos é comum) inspiram-me diariamente. Obrigada pelos desafios constantes, pela sua incansável orientação, por acreditar nas minhas capacidades como investigadora.

Aos Professores **David Crawford**, **Kylie Ball** e **Falko Sniehotta**, três pessoas importantíssimas neste meu processo. Receberam-me de forma calorosa nos seus grupos de investigação e com eles cresci, como pessoa e como investigadora. Orientaram-me cientificamente e transmitiram-me confiança, tão necessária neste processo e ainda mais quando se está sozinha num país distante. Também à **Jutta Mata**, que com o seu *expertise* e a sua habilidade para editar e reduzir texto tanto contribuiu para a melhoria da qualidade deste trabalho, mesmo à distância. Os vossos contributos foram imprescindíveis e para sempre vos estarei grata!

Ao maravilhoso grupo de colegas e amigos que tornam os dias de trabalho tão apetecíveis. **Susana**, foste a primeira pessoa que conheci quando entrei para o grupo. Acompanhaste este meu processo do princípio ao fim e tanto o enriqueceste com o teu jeitinho especial para contactares com os participantes do RNCP, a tua capacidade de resolver situações (à velocidade da luz!), a tua generosidade e a tua amizade (e distrações também!). **Hugo**, desde 2012 a espalhar magia no grupo! Sempre bem disposto e com uma palavra doce e amiga para mim, contribuíste e continuas a contribuir para o meu bem-estar diário. Que aqui a Bea possa acompanhar o teu processo de doutoramento (e animar-te nos dias em que mais precisares) como tu acompanhaste e animaste o meu! **Marta A.,**

identifiquei-me contigo desde o primeiro dia na sala do PESO. Tão metódica quanto eu, tens uma capacidade extraordinária para gerir os nossos projetos (e aquela cujo nome não deve ser pronunciado!), o que melhorou (e continua a melhorar) substancialmente a nossa produtividade. **Marta M.**, a nossa relações públicas! O teu *expertise* em revisões sistemáticas e meta-análises (e noutras temáticas também!) em muito contribuiu para este trabalho! '*May the odds be ever in our favor*' – para mim na finalização deste processo e para ti no começo do teu novo desafio! **Rui**, és a caixinha de surpresas do grupo! Tão diferente hoje de quando te conheci, de certa forma ensinaste-me a relativizar e a ser mais flexível ao longo deste processo. **António**, és claramente o 'faz tudo e mais alguma coisa' do grupo! A tua capacidade *multitasking* tem-me incentivado a fazer mais e melhor. Obrigada pela confiança na gestão de assuntos NoHoW (tão importante nesta minha fase de transição) e '*let the games (aka trial) begin*!' (talvez só a Marta M. perceba...). **Jorge**, o Mr. Magoo (no melhor dos sentidos!) do NoHoW Internacional! Tem sido óptimo poder partilhar os stresses diários do trabalho contigo (e os stresses em pleno voo!). Ah e não esqueçamos os reggaetons...! **Catarina S.**, usando as tuas palavras, és mesmo o meu par perfeccionista! E essa é umas das razões pelas quais gosto bastante de trabalhar contigo. A partilha de incertezas e expectativas foi importante neste último ano. Que possamos trabalhar juntas (no NoHoW e não só) nos próximos anos! **Catarina L., aka Júnior** (como o Hugo te batizou), foste a última aquisição do grupo e foste muito bem adquirida! Tens sido indispensável nas avaliações NoHoW e importante no meu processo de transição de aprendiz para mentora. Espero poder continuar a ensinar-te (e a aprender contigo) nos próximos tempos! Por fim, às três meninas que comigo perfazem o '*four of a kind*': **Marlene**, **Eliana** e **Ana**. Tão diferentes umas das outras, mas quis o destino que nos tornássemos grandes amigas! **Marlene**, és o contrapeso da minha balança emocional e acredito que eu sou da tua também. A nossa sorte é nunca estarmos a pender para o mesmo lado (nunca hiperventilarmos ao mesmo tempo!), senão quem sofria eram os nossos colegas do grupo (e os nossos maridos)! Foste imprescindível neste meu processo! Tens-me ensinado muito ao longo dos últimos anos, estimulas diariamente o meu espírito crítico e encorajas-me a aceitar e enfrentar novos desafios. O teu jeito com as palavras e o teu sentido de justiça tornam-te uma pessoa muito especial. **Eli**, tu és a amiga que nos faz perceber que às vezes complicamos o que é simples e que as nossas crises emocionais eram totalmente desnecessárias. A tua capacidade de separar as emoções dos processos no trabalho é fascinante e muitas vezes essencial. Também tu foste imprescindível neste meu processo e me ensinaste muito. Adoro a tua meiguice e capacidade de foco no trabalho.

Ana, tu és a minha gémea falsa - somos tão iguais em tanta coisa mas tão diferentes em tantas outras! Apesar de teres tido um papel mais ao nível dos afectos do que da ciência neste meu processo, foste essencial! Fizeste-me ver as coisas sob várias perspectivas e ajudaste-me a "gerir-me", e isso em muito contribuiu para que eu avançasse e aqui chegasse. Gosto mesmo muito de ti!

À minha amiga **Margarida**, a "amiga" em toda a acepção da palavra. Os jantares e idas ao cinema marcaram muitos finais de dias de trabalho ao longo dos últimos anos e foram tantas vezes o meu refúgio!

Por último, mas não menos importante, à minha família. **Mãe**, nunca ninguém recebeu mais apoio na vida do que eu recebi de ti. Obrigada por estares sempre aqui para mim! Pelo consolo quando as lágrimas insistiram em cair, pelas gargalhadas tão fáceis de sair, pelo mimo que é constante! Pelas oportunidades que me criaste e principalmente por acreditares sempre e me fazeres acreditar que eu consigo. **Fau**, és a minha irmã mais meiga (e mais stressada também!). Se hoje gosto de ler e de escrever é graças a ti e, por isso, és em parte responsável pelo meu percurso académico. Obrigada pela inspiração nos dias em que as palavras estavam mais difíceis de sair, pelos telefonemas diários de confidências, desabafos e "cusquísses" e por também tu me fazeres sempre acreditar que eu consigo. No meio da tempestade dos últimos anos veio a bonança - ficámos mais próximas do que nunca – e por isso estou imensamente grata! **Tita**, és a minha irmã mais habilidosa, a "mãozinhas de fada". Se me aventurei por terra de mouros e tive capacidade para lidar com as mais diversas (e adversas) situações foi graças à tua influência. Obrigada pela paciência na minha infância e adolescência, por sempre me teres encorajado o espírito curioso e a partir à descoberta. **Guida**, és a minha "irmã" mais pragmática. Sempre com as palavras e a "visão" certas! Obrigada por me "puxares à terra" sempre que precisei ao longo deste caminho (e da minha vida!). **Leonor**, foste o primeiro ser pequenino que amei incondicionalmente. Adoro que sejas a minha fotocópia! A mesma energia, a mesma paixão pelas coisas, a mesma originalidade! Energizas-me e tornaste estes últimos 5 anos (mais 5) mais fáceis, mais felizes! **Miguel**, foste o segundo ser pequenino que amei incondicionalmente, mas apenas por teres nascido mais tarde. És a "pessoinha" mais querida à face da terra! O entusiasmo que vês em tudo e a forma como vês o mundo - em bruto, sem edição, sem preconceitos – têm-me feito ver e trilhar o meu caminho de outra forma! **Ricardo**, sou uma sortuda por te ter na minha vida! Obrigada pelo suporte quando mostrei mais incertezas e inseguranças neste meu percurso (e em tantos outros!), pelo conforto quando as coisas não correram da melhor forma, pelo orgulho que expressaste

quando as coisas correram tão bem, pela paciência, pelo amor. Já o stress era dispensável, o meu já é suficiente! Mas faz parte... **Pai**, sinto a tua falta todos os dias.

ABSTRACT

This dissertation thought to provide a comprehensive understanding of weight loss- and maintenance-related processes among adults. Specifically, it comprises a set of five studies that were designed to i) determine the prevalence of weight control attempts and identify correlates, personal strategies, and motives underlying these attempts; ii) examine behavioral and psychological characteristics as predictors of successful weight loss and maintenance; and iii) examine psychological predictors of physical activity, a critical behavior for successful weight control.

Studies I and II reflect the state of the art regarding the prevalence of weight control attempts among adults on a global and national level, respectively, showing that weight is a matter of concern to a significant portion of the adult population. Study III aimed for a more in-depth understanding of who succeeds in weight loss and maintenance, showing that there is a multiplicity of potentially successful behaviors and strategies. Subsequently, study IV showed that psychological factors underlying the weight control behaviors, such as positive body image and autonomous motivation, have a critical role in the process. Finally, study V confirmed that more autonomous forms of motivation are key for maintaining physical activity behavior over time in those trying to achieve weight loss and maintenance.

The findings in this thesis highlight the need for, and importance of developing long-term individualized approaches for successful weight loss and maintenance, under the umbrella of motivation and related psychological factors. Future weight management initiatives would benefit from targeting combinations of evidence-based weight control strategies and the improvement of body image and motivation quality as potential precursors of those strategies, in order to promote long-term weight loss maintenance. Furthermore, it has become clear that weight control attempts are prevalent in Portugal and worldwide and consequently changes and trends should be monitored regularly in order to inform and advance future practice.

Keywords: Weight loss; Weight maintenance; Strategies; Motivation; Behavior

RESUMO

Esta dissertação teve como objetivo promover um entendimento alargado no que respeita aos processos relacionados com a perda e manutenção do peso em adultos. Inclui um conjunto de cinco estudos com o intuito de i) determinar a prevalência das tentativas de controlo do peso e identificar correlatos, as estratégias utilizadas e os motivos associados; ii) explorar características comportamentais e psicológicas como preditores da perda e manutenção do peso com sucesso; e iii) explorar preditores psicológicos da atividade física, um comportamento crítico para o sucesso no controlo do peso.

Os estudos I e II refletem o estado da arte no que respeita às tentativas de controlo do peso em adultos, respectivamente a nível global e nacional, revelando que o peso é uma preocupação para uma porção significativa da população adulta. O estudo III procurou compreender quem efetivamente conseguiu perder e manter o peso, revelando que há uma panóplia de potenciais estratégias e comportamentos de sucesso. Subsequentemente, o estudo IV mostrou que factores psicológicos subjacentes aos comportamentos de controlo do peso, como por exemplo uma imagem corporal positiva e motivação autónoma, têm um papel crítico no processo. Por fim, o estudo V confirmou que motivações mais autónomas são cruciais para a manutenção da atividade física a longo prazo em pessoas a tentar perder e manter o peso.

Em conjunto, os resultados desta tese sublinham a necessidade e a importância de desenvolver abordagens de longo-prazo individualizadas para o sucesso na perda e manutenção do peso, sob a égide da motivação e factores psicológicos relacionados. Iniciativas futuras de gestão do peso irão beneficiar de uma abordagem direcionada a estratégias de controlo do peso baseadas na evidência e à melhoria da imagem corporal e da qualidade da motivação como potenciais percursores destas estratégias, de forma a promover a manutenção do peso perdido. Adicionalmente, tornou-se claro que as tentativas de controlo do peso são prevalentes em Portugal e em todo o mundo e, consequentemente, as alterações e tendências de controlo do peso devem ser monitorizadas regularmente de forma a informar e desenvolver a prática futura.

Palavras-chave: Perda de Peso; Manutenção do Peso; Estratégias; Motivação; Comportamento

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

CHAPTER 1

Introduction

"What makes it so hard to lose weight and keep it off?"

Bray & Wadden, Obesity (2015):23:2-3

Overweight and obesity: a public health burden

Throughout the world, overweight and obesity pose one of the major public health threats. The latest World Health Organization (WHO) estimates are that approximately 1.9 billion adults are classified as overweight (defined as a body mass index [BMI] ≥ 25 kg/m^2), of which over 600 million are in the obese category (defined as a BMI ≥ 30 kg/m^2). These estimates have more than doubled in the last quarter century (1), and projections for 2030 indicate that both the US and Europe will face an obesity crisis of even greater proportions, potentially becoming mainly obese societies (2, 3).

From a public health perspective, overweight and obesity are major concerns because of their well-documented contribution to a wide range of chronic diseases, such as cardiovascular disease, type 2 diabetes, hypertension and cancer (4), as well as their social and psychological consequences, which impair individuals' wellbeing and quality of life. Obesity's economic implications are also documented and represent a major source of concern (5).

The causes of this incessant increase in the number of individuals with excess weight all around the world are multifaceted. Complex interactions between biological, behavioral, social and environmental factors are involved (6). Energy dense and nutritionally unbalanced diets, as well as a decrease in regular physical activity and an increase in sedentary activities, are the direct antecedents of a positive energy balance (or an energy imbalance) in the population, being critical etiological factors at the behavioral level. However, the root causes of these behaviors rely on powerful and wide-ranging changes in the social, economic, cultural and physical environment (7) that started with the agricultural and technological revolutions of the late 20th century. At the individual level, this modern lifestyle has taken body weight control from an instinctual process to one that requires substantial conscious effort (8). In previous times, the primary challenge to the body weight control physiological system was to obtain sufficient energy intake to keep pace with energy expenditure, since high levels of physical activity were required for daily subsistence and food was inconsistently available, and therefore human biology evolved to encourage adaptive behaviors, ensuring survival - individuals ate as much as they could when food was available and preserved energy when physical activity was not required (8). However, nowadays, minimal amounts of physical activity are required to function in daily life and food is abundant, widely available, and easily accessible. Thus, the challenge to our physiological system to control body weight is to increase physical activity sufficiently

to compensate for the positive energy balance promoted by the environment, since there appears to be only a weak adaptive increase in resting energy expenditure in response to excess energy intake, and the drive to increase voluntary physical activity does not appear to be strong enough (8). The current environment will therefore drive many individuals towards excess weight, unless a conscious effort to reduce energy intake and/or increase physical activity is made.

Obesity prevention and treatment: are we fighting a losing battle?

The present and forecasted overweight and obesity trends and the consequently adverse effects on physical and psychological health, as well as the economic drain of this condition on the healthcare system, resulted in a broad consensus that there is an urgent need for action (5, 7).

If the current environment is driving more and more individuals to excess weight gain, then one obvious solution is to change the environment back to one that requires less conscious effort to manage body weight (8). However, because environment has a socio-cultural basis, changes to promote greater physical activity and discourage excess energy intake need to be accepted and supported by the population and, as a society, we are not likely to simply give up the convenient modern lifestyle we have built for living in (8). So the WHO recognized that the solution for reversing the overweight and obesity trends relies on shaping societies to where physical activity and healthy eating are the norm, where these healthy lifestyle behaviors are aligned with the socio-cultural values, and where healthy choices are made more accessible and effortless for individuals (7). To translate this into practice, action should focus, among other features, in implementing comprehensive, integrated, and multi-sectorial initiatives, both at a population and individual levels (5). However, to implement such successful initiatives, the processes around weight loss and its maintenance must first be well understood.

'Once gained, weight is difficult to lose' (5(p10)), and thus population-wide prevention of overweight and obesity has been acknowledged as the most likely cost-effective approach and with greater impact on long-term obesity control (9). However, considering the prevalence rates, there are already many overweight and obese individuals requiring treatment. A core component of both obesity prevention and treatment are personal weight control attempts (i.e., intentionally trying to lose and maintain weight), as they reflect an active investment of the population in trying to change and sustain changes

in their lifestyle (10). Studying these attempts is particularly important for public health, as it allows a proper understanding of the public's response to the excess weight problem, contributing to better planning, development, implementation, and improvement of weight control initiatives.

According with the most recent guidelines for the management of overweight and obesity in adults (11, 12), comprehensive lifestyle interventions addressing diet and physical activity through the use of behavioral strategies are foundational to promote weight loss, maintenance and prevent weight regain, and represent the first step in the treatment of excess weight and its co-morbidities. Researchers have been generally successful in designing effective lifestyle interventions (also known as behavior change interventions), with average weight losses of 8%-10% of initial body weight *during treatment* (e.g., (13)). For instance, the Look AHEAD (i.e., Action for Health in Diabetes) multicentered, randomized, controlled trial, which was designed to investigate the long-term health impact of an intensive lifestyle intervention in 5145 overweight and obese individuals with type II diabetes, showed that, at 1 year, participants in the intervention group achieved an average weight loss of 8.6% and a 21% improvement in cardiovascular fitness (14). Since sustained weight losses of 3-5% already produce clinically meaningful health benefits (11), this could be considered optimistic. Another example with positive results comes from the PESO (i.e., Promotion of Exercise and Health in Obesity) randomized controlled trial, which consisted of a behavioral intervention aiming at promoting long-term weight control by increasing participants' autonomous motivation toward physical activity and eating behaviors, in 221 pre-menopausal overweight and obese women (15). Results at the end of the 1-year intervention showed that participants in the intervention group lost on average 7.3% of their initial weight, comparing with 1.7% weight loss in the control group (16).

However, after the end of most of these behavioral approaches, many individuals experience significant weight regain, typically regaining one-third of the weight lost within the first year following treatment and the other two-thirds within 3 to 5 years after the end of the treatment (17). Indeed, results from the PESO study at 2 years (after the first year of follow-up) showed an average weight loss from baseline of 5.5% in the intervention group (vs. 2.2% in the control group), and at 3 years (after the second year of follow-up) an average weight loss of 3.9% (vs. 1.9% in the control group) (18). Results of the Look AHEAD – the largest and longest randomized evaluation to date of an intensive lifestyle

intervention on weight reduction – show that even with regular lifestyle counseling in the following 7 years, participants in the intervention group showed an average weight loss of 4.4% at 4 years and 4.7% at 8 years (19). This gradual regain is often followed by repeated weight loss attempts. A recent systematic review and meta-analysis of randomized controlled trials for maintenance of non-surgical weight loss concluded that although there is already some evidence that behavioral interventions can be effective in reducing weight regain after initial weight loss up to 2 years, the strength of this evidence is limited (due to methodological issues) (20).

So, is the belief of the general public that no one succeeds at long-term weight loss factual? Is any attempt to lose weight and sustain its loss in the long-run futile? While it is true that there are physiological "counter-regulatory" mechanisms (e.g., adaptive thermogenesis) that serve to oppose weight loss maintenance and facilitate weight regain (21), these mechanisms represent challenges that require alternative efforts after weight loss rather than indications to presuppose that such efforts are fruitless. For example, adding elements of acceptance and commitment therapy (e.g., helping participants accept the physical discomfort of reduction in pleasure and focus on their long-term values when choosing eating and physical activity behaviors) to a standard behavioral treatment may position participants to adhere to recommendations for lifestyle modification in the face of powerful biological and environmental challenges, improving behavioral weight loss and maintenance outcomes (22, 23). Therefore, a thorough understanding of the processes involved in adopting and maintaining healthy behaviors remains paramount for encouraging and supporting individuals to continue their battle with excess weight and provide them with improved programs and tools to better face it.

Weight loss and maintenance: searching for clues

A working group of experts from the National Institutes of Health (NIH) recently discussed the problem of long-term weight control. One underlying assumption of this working group' report is that weight loss is possible and beneficial for all individuals with excess weight, although they identified many significant challenges (24). Commenting on the report, Bray and Wadden (25) stated that the most important one was individual variability. In fact, a remarkable variability in weight loss outcomes is observed in all behavioral interventions, with some individuals losing a great amount of weight, others the average amount, and some even gaining weight; furthermore, this variability appears to

increase during maintenance (24). However, it is not clear why behavioral interventions work more effectively for some individuals than for others. An approach for understanding these individual differences/responses is studying individuals who succeeded in weight loss and maintenance. Studying their lifestyle patterns and identifying the social, psychological, physiological, and behavioral characteristics that most contribute to long-term success may provide useful insights for improving treatment programs, as it could help health professionals in matching individuals to different strategies that would benefit them more.

The National Weight Control Registry (NWCR) has been providing continuous insight into the process of weight loss maintenance over the past two decades (26). In over 6000 successful weight loss maintainers, who have lost at least 13.6 kg and have maintained the weight loss for at least 1 year, researchers have identified common behaviors and strategies used by these individuals for achieving weight loss and maintenance, including eating a low-calorie and low-fat diet, eating breakfast regularly, maintaining a consistent eating pattern across weekdays and weekends, consistent self-monitoring of body weight and food intake, and engaging in relatively high levels of physical activity (27). Nevertheless, within this group of real life successful weight loss maintainers, Ogden and colleagues (28) identified subgroups of individuals with different characteristics and relying on different behavioral strategies for weight loss and its maintenance (e.g., 50% of participants revealed being highly physically active to control their weight, while 10% did not use this strategy), suggesting that different individuals will require different strategies and different levels of resources and support for achieving success.

Closely linked to the NWCR is the Portuguese Weight Control Registry (PWCR), which was established in 2008 with the same goal of investigating characteristics associated with successful weight loss maintenance but in Portuguese adults (29, 30). Given the well-known influence of social, environmental and cultural factors on overweight and obesity (31), studying weight loss maintainers from different populations is important to inform public health interventions towards the specific characteristics of the populations and individuals. A description of the characteristics of an initial sample of PWCR' participants (n=198) - who have lost at least 5 kg and have maintained the weight loss for at least 1 year -, pointed in the same direction, with similar strategies to those used by the NWCR' participants despite some specificities (e.g., Portuguese weight loss maintainers revealed more outdoor physical activities while American participants

revealed more indoor activities) (29). Since then, the sample of PWCR' participants doubled providing opportunities for exploring in more depth correlates of successful weight loss and maintenance.

Long-term weight control randomized controlled trials also provide a good setting for identifying critical factors for weight loss and maintenance, allowing for causal relationships to be determined (32). In this regard, a review of psychosocial pre-treatment predictors of long-term weight control identified several prospective predictors, with few previous weight loss attempts emerging as the strongest (33). An example of potential factors through which interventions operate (i.e., treatment-induced predictors) can be given within the context of the PESO study, where Silva et al. found that experimentally increased and sustained moderate and vigorous physical activity (at 2 years) significantly mediated long-term weight loss maintenance (at 3 years) (18). Interestingly, few previous weight loss attempts (30) and participation in high levels of physical activity (27) were two behaviors consistently reported by most registered successful weight loss maintainers. Therefore, prospectively predicting weight loss and maintenance outcomes within intervention studies will definitely help shaping obesity treatment solutions.

Another important barrier identified by the NIH experts' working group for weight loss and maintenance was adherence to weight management regimens (24). Evidence shows that adherence to diet and physical activity behaviors, group attendance, and completion of self-monitoring are associated with both initial and long-term weight loss (34). However, long-term adherence to programs/behaviors is a challenge since, among other features, the perceived costs of adherence (cognitive and physical efforts needed to lose weight) gradually exceed the perceived benefits (positive consequences of losing weight, such as sense of accomplishment or better fit in clothes) during the course of treatment, leading to declining adherence (35). So, how can it (long-term adherence) be promoted? Understanding the motivational factors underlying behavioral maintenance in order to change the cost:benefit ratio might be one path to follow.

Individual reasons for weight management attempts vary considerably and there is both theoretical and empirical support for investigating whether motivational processes underlying behavioral regulation help explain part of the success and failure in obesity management (36). A recent systematic review on theoretical explanations for behavior change maintenance identified five interconnected themes reflecting theoretical

explanations about how individuals maintain initial behavior changes over time (37). One of these themes focused on maintenance *motives*, which are hypothesized to facilitate behavior change maintenance by enabling specific satisfaction-related outcomes derived from engaging in the new behavior. Among other features, one difference between initiation and maintenance motives could lie on the level of *self-determination* experienced by individuals, something that often develops after initiating the new behavior.

Self-determination, commonly referred to as autonomy, is related to the perceived origin of one's behavior or its (internal) *locus of causality* – that is, the extent to which a behavior is adopted with a sense of choice and self-endorsement. According to self-determination theory (SDT) (38, 39), having the psychological need for *autonomy* satisfied, together with the need for *competence* (i.e., an individuals' need to feel a sense of mastery and capacity to accomplish the behavior) and *relatedness* with others (i.e., an individuals' need to feel meaningfully connected to others, valued and understood) energizes autonomous motivation, promoting behavioral persistence and well-being (40). In turn, when these three needs are thwarted, people will tend to develop controlled motivations, regulating their behavior based on external contingencies and internalized self-judgments (41). Evidence from several domains supports the theoretical premise that different motivational regulatory processes underlying goal pursuit are differentially associated with behavioral outcomes and wellbeing. Importantly, it suggests that *maintaining* certain behaviors over time (which is crucial for weight management) requires that the individual internalizes and integrates values and skills for change, and experience self-determination (42, 43). Recent developments in the theory show that not only regulatory processes can be different (as a result of need satisfaction vs. frustration), but also that "not all goals are created equal" (44). In brief, the outcomes that individuals are pursuing through the new behavior – i.e., the *content* of individuals' goals or aspirations – can have intrinsic or extrinsic qualities, which can also influence behavior maintenance. Relative to "extrinsic goals" (e.g., wealth, social recognition, physical attractiveness), "intrinsic" goals (e.g., health, personal growth, social connectedness) tend to be regulated by more self-determined forms of behavioral regulation and are thought to result in improved self-regulation and longer-term outcomes (45, 46). Thus, exploring in more depth the motivational dynamics involved in the adoption and maintenance of critical weight control behaviors and long-term weight control is of great relevance for developing weight management interventions with lasting effects and should be a research priority.

In sum, achieving and maintaining weight loss is a critical yet elusive target for many individuals worldwide (24). Changing the behaviors associated with weight loss and maintaining them in the long-run (i.e., changing the process) can be very difficult; losing weight and keeping it off (i.e., changing the outcome) can be even more challenging (5). To address these challenges, it is important to better understand the universe of people who is seeking weight control and who succeed in long-term weight loss and maintenance. Who are these individuals? Which behaviors characterize them? Which reasons trigger the behaviors? Which factors underpin long-term success?

Aims of the thesis

The present thesis sought to provide a comprehensive understanding of weight loss- and maintenance-related processes among adults, by answering three central questions: 1) **What is known** about weight control attempts in adults (i.e., **how many** weight control attempts are made, by **whom, how** and **why**)?; 2) **What predicts successful** weight loss and maintenance; and 3) **What predicts engagement** in critical behaviors for successful weight loss and maintenance? As a result, this dissertation was primarily designed to:

i) Determine the prevalence of weight control attempts and identify correlates, personal strategies used, and underlying motives among adults;
ii) Examine behavioral and psychological characteristics as predictors of successful weight loss and maintenance in adults;
iii) Examine psychological predictors of physical activity behavior in individuals pursuing weight control.

Outline of the thesis

This thesis comprises a collection of five research articles published in peer-review journals in the field of obesity and health with an established ISI Impact Factor. This series of articles contains several novel attributes, collectively aiming to contribute to the body of literature on a national and international level. The present document is organized in seven chapters plus an Appendices section, as follows:

- This first chapter (**Chapter 1**) provided a general introduction aiming at presenting an overview of the topic that informs the main research questions and goals of the five studies included. Additionally, this chapter outlines the relevance and the flow of the studies and highlights the diversity of samples and types of studies conducted, and the different statistical analyses applied in the studies that follow.
- **Chapter 2** presents the first study, a systematic review and meta-analysis on the prevalence of weight loss and maintenance attempts among adults worldwide. Several potential moderators were explored and a comprehensive description of the strategies and motives underlying those weight control attempts was also provided, as these may inform public health practices and contribute to improve obesity prevention and treatment.
- **Chapter 3** reflects the second study, an epidemiological survey determining the prevalence of weight control attempts and related behavioral strategies and motives among Portuguese adults. This study was developed to extend the main goals of the first study to the Portuguese context because in Portugal there was no current representative data available on how many people were trying to control their weight, how and why. Behaviors and practices are context-sensitive and, therefore, a better understanding of the Portuguese's behaviors regarding weight control in the present-days is useful for the promotion of more effective weight management practices in the Portuguese population.
- Sequentially, the third study **(Chapter 4**) was conceived to explore behavioral characteristics associated with long-term weight loss maintenance in a unique ecologic Portuguese sample constituted by individuals already successful at weight loss maintenance. The identification of such characteristics is critical to learn how to help people who struggle with long-term weight management.
- Fueled by the need of further identifying characteristics as predictors of sustained weight loss, the fourth study (**Chapter 5**) aimed to examine behavioral and psychological predictors of weight loss maintenance at three years in previously overweight Portuguese women involved in a behavioral weight management randomized controlled trial. Using a novel statistical approach that determines significant predictors in a hierarchical fashion, profiles of success were created and cut-off values for the significant determinants of successful long-term weight loss maintenance were provided.

- To extend previous findings, the fifth study (**Chapter 6**) was designed to explore psychological predictors of a critical behavior for successful weight management: physical activity. This study examined associations between different aspects of physical activity motivation and barriers with short- and long-term physical activity behavior in women and whether these associations differed between those who were pursuing and not pursuing weight control.
- The last chapter (**Chapter 7**) integrates and discusses the main empirical findings from the five studies, providing a comprehensive understanding of weight loss attempts and factors associated with long-term weight loss maintenance. Practical implications and directions for future research are presented.
- Finally, the Appendices section includes:
    i) the protocol of the first study (Chapter 2);
    ii) two articles published in special issues of non-peer-review journals, directly related to the thesis – the first with a short description of the PWCR, published in a national journal, and the second with a motivational perspective on weight loss maintenance, published in an European journal;
    iii) the self-report instruments used;
    iv) the abstracts of oral/poster communications related to the studies presented in the thesis.

Due to the nature of this thesis, which is based on independent peer-review articles, there may be some duplication of information, particularly in the introduction and discussion sections of the articles. Chapter 2 to 6 are presented as individual empirical manuscripts, with their own abstract, introduction, methods, results, discussion and references sections. Each of these articles followed the format requested by the journal of publication. The first and the last chapters intend to interrelate the content of this series of articles, providing an overall coherence to this document.

List of articles and conference communications

The investigation carried out as part of the present doctoral research program resulted in the following publications and communications (oral/poster) as first author:

Peer-reviewed articles published

Santos I, Andrade AM, Teixeira PJ. (2015). Weight control attempts among Portuguese adults: Prevalence, motives and behavioral strategies [Portuguese]. Acta Médica Portuguesa, 28(1):77-86.

Santos I, Mata, J, Silva, MN, Sardinha LB, Teixeira PJ. (2015). Predicting long-term weight loss maintenance in previously overweight women: A signal detection approach. Obesity, 23(5):957-964.

Santos I, Ball K, Crawford DA, Teixeira PJ. (2016). Motivation and barriers for leisure-time physical activity in socioeconomically disadvantaged women. PLoS ONE, 11(1) :e0147735.

Santos I, Sniehotta FF, Marques MM, Carraça EV, Teixeira PJ. (2016) Prevalence of personal weight control attempts in adults: a systematic review and meta-analysis. Obesity Reviews, 18(1):32-50.

Santos I, Vieira PN, Silva MN, Sardinha LB, Teixeira PJ. (2016). Weight control behaviors of highly successful weight loss maintainers: The Portuguese Weight Control Registry. Journal of Behavioral Medicine, DOI 10.1007/s10865-016-9786-y.

Other articles

Santos I, Vieira PN, Teixeira PJ. (2014). Perfil comportamental de adultos portugueses com sucesso na manutenção do peso perdido: O Registo Nacional de Controlo do Peso. Revista Factores de Risco, 34:50-55.

Santos I, Silva MN, Teixeira PJ. (2016). A self-determination theory perspective on weight loss maintenance. The European Health Psychologist, 18(5):194-199.

Published abstracts (poster communications)

Santos I, Andrade AM, Teixeira PJ. (2013). Prevalence of weight control attempts and behavioral strategies among Portuguese adults: A national survey. Obes Facts, 6(Suppl. 1):191.

Santos I, Andrade AM, Teixeira PJ. (2013). Controlo do peso em Portugal: prevalência e estratégias comportamentais. Revista Portuguesa de Cirurgia, Suppl:42.

Santos I, Mata J, Carraça EV, Silva MN, Sardinha LB, Teixeira PJ. (2014). Three-year weight management in overweight women: A signal detection analysis of behavioral and psychological predictors. Obes Facts, 7(Suppl. 1):134.

Non-published abstracts (oral and poster communications)

Santos I, Vieira P, Teixeira PJ. (2012). Perder e manter o peso em Portugal: Ingestão alimentar e atividade física no Registo Nacional de Controlo do Peso. Congresso Português de Dietética e Nutrição, Lisboa, Portugal.

Santos I, Ball K, Teixeira PJ, Crawford DA. (2013). Cross-sectional and longitudinal associations between physical activity motivation and physical activity behavior in women. 12th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Ghent, Belgium.

Santos I, Ball K, Teixeira PJ, Crawford DA. (2013). Motivation for physical activity in socially disadvantaged Australian women. MeMo International Lunch Meeting at the 12th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Ghent, Belgium.

Santos I, Mata J, Silva MN, Sardinha LB, Teixeira PJ. (2014). Predicting long-term weight loss maintenance in overweight women: Post-treatment profiles based on a signal

detection approach. 13th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, San Diego, California.

Santos I, Carraça EV, Marques M, Sniehotta F, Teixeira PJ. (2015). Prevalence and correlates of non-surgical weight control attempts in adults: a systematic review and meta-analysis. 14th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Edinburgh, Scotland.

Santos I, Carraça EV, Marques M, Sniehotta F, Teixeira PJ. (2016). Weight control attempts in adults: a systematic-review and meta-analysis. 15th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Cape Town, South Africa.

This investigation also resulted in the following publications and communications (oral/poster) as co-author:

Peer-reviewed articles published

Vieira PN, Silva MN, Coutinho SR, Santos TC, **Santos I**, Sardinha LB, Teixeira PJ. (2012). Successful weight loss maintenance in Portugal and in the USA: comparing results from two National Registries [Portuguese]. Revista Portuguesa de Saúde Pública, 30(2):115-124.

Wasserkampf A, Silva MN, **Santos I**, Carraça EV, Meis JJM, Kremers SPJ, Teixeira PJ. (2014). Short- and long-term theory-based predictors of physical activity in women who participated in a weight-management program. Health Educ Res. DOI 10.1093/her/cyu060.

Other articles

Teixeira PJ, Pereira H, Silva MN, Carraça EV, **Santos I**, Vieira PN, Minderico C, Coutinho S, Santos T, Sardinha LB. (2014). O programa P.E.S.O.: Descrição dos resultados principais. Revista Factores de Risco, 34:68-80.

Published abstracts (poster communications)

Silva MN, **Santos I**, Carraça EV, Vieira PN, Teixeira PJ. (2012). Motivational correlates of exercise behavior among long-term weight loss maintainers. Obes Facts, 5(Suppl. 1):193.

Non-published abstracts (oral and poster communications)

Silva JD, **Santos I**, Silva MN, Carraça EV, Teixeira PJ. (2013). "I exercise in order to...". Long-term changes in exercise-related goals in previously overweight women". 12th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Ghent, Belgium.

Pereira HV, Silva MN, Carraça EV, **Santos I**, Sardinha LB, Teixeira PJ. (2013). Autonomous motivation and lifestyle physical activity: results from a 3-year SDT-based randomized controlled trial. 12th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Ghent, Belgium.

Silva MN, Carraça EV, **Santos I**, Palmeira AL, Sardinha LB, Teixeira PJ. (2013). More is sometimes less: the role of quantitative and qualitative motivation for physical activity, eating behavior, and well-being. 12th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Ghent, Belgium.

Silva JD, **Santos I**, Carraça EV, Silva MN, Marques M, Markland D, Standage M, Teixeira P. (2014). Exercise-related goal contents and long-term physical activity changes in previously overweight women. 13th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, San Diego, California.

Pereira HV, Palmeira AL, Silva MN, **Santos I**, Rovisco R, Morgado J, Teixeira PJ. (2016). Associations between needs satisfaction and behavioral regulations in a sample of recreational runners. 6th International Conference on Self-Determination Theory, Victoria, Canada.

References

1. World Health Organization. Obesity and overweight. Available from: http://www.who.int/mediacentre/factsheets/fs311/en/ [Accessed August 2016].
2. Finkelstein EA, Khavjou OA, Thompson H, Trogdon JG, Pan L, Sherry B, et al. Obesity and severe obesity forecasts through 2030. Am J Prev Med. 2012;42(6):563-570.
3. Breda J, Jewell J, Webber L, Galea G. WHO projections in adults to 2030. *22nd European Congress on Obesity (ECO2015), May 6-9 2015, Prague, Czech Republic*. Obes Facts 2015;8(suppl 1):1-272.
4. Kopelman P. Health risks associated with overweight and obesity. Obes Rev. 2007;8 Suppl 1:13-17.
5. Butland B, Jebb S, Kopelman P, McPherson K, Thomas S, Mardell J, et al. *Foresight Tackling Obesities: Future Choices - Project report, 2nd Edition.* Government Office for Science, 2007.
6. Vandenbroeck IP, Goossens J, Clemens M. *Obesity System Atlas.* Foresight Tackling Obesities: Future Choices, 2007.
7. WHO European Charter on counteracting obesity. *WHO European Ministerial Conference on Counteracting Obesity: Diet and physical activity for health*. Istanbul, Turkey: World Health Organization; 2006.
8. Peters JC, Wyatt HR, Donahoo WT, Hill JO. From instinct to intellect: the challenge of maintaining healthy weight in the modern world. Obes Rev. 2002;3(2):69-74.
9. World Health Organization. *Obesity: preventing and managing the global epidemic.* Report of a WHO consultation (WHO Technical Report Series 894). Geneva: World Health Organization; 2000.
10. Powell LH, Calvin JE. Effective obesity treatments. Am Psychol. 2007;62(3):234-246.
11. Jensen MD, Ryan DH, Apovian CM, Ard JD, Comuzzie AG, Donato KA, et al. 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. Circulation. 2014;129:S102-S138.

12. Yumuk V, Tsigos C, Fried M, Schindler K, Busetto L, Micic D, et al. European Guidelines for Obesity Management in Adults. Obes Facts. 2015;8(6):402-424.
13. Wadden TA, Butryn ML, Wilson C. Lifestyle modification for the management of obesity. Gastroenterol. 2007;132(6):2226-2238.
14. Pi-Sunyer X, Blackburn G, Brancati FL, Bray GA, Bright R, Clark JM, et al. Reduction in weight and cardiovascular disease risk factors in individuals with type 2 diabetes: one-year results of the look AHEAD trial. Diabetes Care. 2007;30(6):1374-1383.
15. Silva MN, Markland D, Minderico CS, Vieira PN, Castro MM, Coutinho SR, et al. A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight control: rationale and intervention description. BMC Public Health. 2008;8:234.
16. Silva MN, Vieira PN, Coutinho SR, Minderico CS, Matos MG, Sardinha LB, et al. Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. J Behav Med. 2010;33(2):110-122.
17. Butryn ML, Webb V, Wadden TA. Behavioral treatment of obesity. Psychiatr Clin North Am. 2011;34(4):841-859.
18. Silva MN, Markland D, Carraca EV, Vieira PN, Coutinho SR, Minderico CS, et al. Exercise autonomous motivation predicts 3-yr weight loss in women. Med Sci Sports Exerc. 2011;43(4):728-737.
19. Eight-year weight losses with an intensive lifestyle intervention: the look AHEAD study. Obes (Silver Spring). 2014;22(1):5-13.
20. Dombrowski SU, Knittle K, Avenell A, Araujo-Soares V, Sniehotta FF. Long term maintenance of weight loss with non-surgical interventions in obese adults: systematic review and meta-analyses of randomised controlled trials. BMJ. 2014;348:g2646.
21. Muller MJ, Bosy-Westphal A. Adaptive thermogenesis with weight loss in humans. Obes (Silver Spring). 2013;21(2):218-228.
22. Forman EM, Butryn ML, Manasse SM, Crosby RD, Goldstein SP, Wyckoff EP, et al. Acceptance-based versus standard behavioral treatment for obesity: Results from the mind your health randomized controlled trial. Obes (Silver Spring). 2016;24(10):2050-2056.
23. Wadden TA, Berkowitz RI. Advancing the revolution in the behavioral treatment of obesity. Obes (Silver Spring). 2016;24(10):2029-2030.

24. MacLean PS, Wing RR, Davidson T, Epstein L, Goodpaster B, Hall KD, et al. NIH working group report: Innovative research to improve maintenance of weight loss. Obes (Silver Spring). 2015;23(1):7-15.
25. Bray GA, Wadden TA. Improving long-term weight loss maintenance: can we do it? Obes (Silver Spring). 2015;23(1):2-3.
26. Klem ML, Wing RR, McGuire MT, Seagle HM, Hill JO. A descriptive study of individuals successful at long-term maintenance of substancial weight loss. Am J Clin Nutr. 1997;66(2):239-246.
27. Wing RR, Phelan S. Long-term weight loss maintenance. Am J Clin Nutr. 2005;82(1):222S-225S.
28. Ogden LG, Stroebele N, Wyatt HR, Catenacci VA, Peters JC, Stuht J, et al. Cluster analysis of the national weight control registry to identify distinct subgroups maintaining successful weight loss. Obes (Silver Spring). 2012;20(10):2039-2047.
29. Vieira PN, Silva MN, Coutinho SR, Santos TC, Santos I, Sardinha LB, et al. Successful weight loss maintenance in Portugal and in the USA: comparing results from two National Weight Control Registries [Portuguese]. Rev Portuguesa Saúde Pública. 2012;30(2):115-124.
30. Vieira PN, Teixeira P, Sardinha LB, Santos T, Coutinho S, Mata J, et al. Success in maintaining weight loss in Portugal: The Portuguese Weight Control Registry [Portuguese]. Cie Saude Colet. 2014;19(1):83-92.
31. Heitmann BL, Westerterp KR, Loos RJF, Sorensen TIA, O'Dea K, McLean P, et al. Obesity: lessons from evolution and the environment. Obes Rev. 2012;13(10):910-922.
32. Kraemer HC, Wilson GT, Fairburn CG, Agras WS. Mediators and moderators of treatment effects in randomized clinical trials. Arch Gen Psychiatry. 2002;59(10):877-883.
33. Teixeira PJ, Going SB, Sardinha LB, Lohman TG. A review of psychosocial pre-treatment predictors of weight control. Obes Rev. 2005;6(1):43-65.
34. Wadden TA, West DS, Neiberg RH, Wing RR, Ryan DH, Johnson KC, et al. One-year weight losses in the Look AHEAD study: factors associated with success. Obes (Silver Spring). 2009;17(4):713-722.
35. Perri MG. The Maintenance of Treatment Effects in the Long-Term Management of Obesity. Clin Psychol: Sci Practice. 1998;5(4):526-543.

36. Teixeira PJ, Silva MN, Mata J, Palmeira AL, Markland D. Motivation, self-determination, and long-term weight control. Int J Behav Nutr Phys Act. 2012;9:22.
37. Kwasnicka D, Dombrowski SU, White M, Sniehotta F. Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. Health Psychol Rev. 2016:1-20.
38. Deci EL, Ryan RM. Self-determination theory: A macrotheory of human motivation, development, and health. Canadian Psychol. 2008;49(3):182-185.
39. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol. 2000;55(1):68-78.
40. Deci EL, Ryan RM. The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychol Inq. 2000;11(4):227-268.
41. Vansteenkiste M, Ryan RM. On psychological growth and vulnerability: basic psychological need satisfaction and need frustration as a unifying principle. J Psychotherapy Integration. 2013;23(3):263-280.
42. Teixeira PJ, Carraca EV, Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: a systematic review. Int J Behav Nutr Phys Act. 2012;9:78.
43. Ng JY, Ntoumanis N, Thogersen-Ntoumani C, Deci EL, Ryan RM, Duda JL, et al. Self-Determination Theory Applied to Health Contexts: A Meta-Analysis. Perspect Psychol Sci. 2012;7(4):325-430.
44. Vansteenkiste M, Niemiec CP, Soenens B. The Development of the Five Mini-theories of Self-determination Theory: An Historical Overview, Emerging Trends, and Future Directions. In: Urdan TC, Karabenick SA, editors. *The Decade Ahead : Theoretical Perspectives on Motivation and Achievement*. 16A. Bingley, UK: Emerald; 2010. p. 105–166.
45. Ingledew DK, Markland D. Three levels of exercise motivation. Applied Psychol: Health and Well-Being. 2009;1(3):336-355.
46. Kasser T, Ryan RM. Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. Personality Social Psychol Bulletin. 1996;22(3):280-287.

CHAPTER 2

Prevalence of personal weight control attempts in adults: a systematic review and meta-analysis (Study I)[1]

[1] **Santos I**, Sniehotta FF, Marques MM, Carraça EV, Teixeira PJ. (2016). Prevalence of personal weight control attempts in adults: a systematic review and meta-analysis. Obesity Reviews, 18(1):32-50. (IF: 7.510)

Abstract

The purpose of this systematic review and meta-analysis was to estimate the prevalence of personal weight control attempts (weight loss and/or maintenance) worldwide and to identify correlates, personal strategies used and the underlying motives. We included epidemiological/observational studies of adults (≥18y) reporting prevalence of weight control attempts in the past-year. Seventy-two studies (n=1,184,942) met eligibility criteria. Results from high quality studies showed that 42% of adults from general populations and 44% of adults from ethnic-minority populations reported trying to *lose* weight, and 23% of adults from general populations reported trying to *maintain* weight annually. In general population studies, higher prevalence of weight *loss* attempts was observed in the decade of 2000-2009 (48.2%), in Europe/Central Asia (61.3%), in overweight/obese individuals and in women ($p<0.01$). Of the 37 strategies (grouped in 10 domains of the Oxford Food and Activity Behaviors Taxonomy) and 12 motives reported for trying to control weight, exercising and dieting (within the energy compensation and restraint domains, respectively) and wellbeing and long-term health were the most prevalent. To our knowledge, this is the first systematic review to investigate weight control attempts worldwide. Key strategies and motives were identified which have implications for future public health initiatives on weight control.

Keywords: Weight loss; Maintenance; Strategies; Motives

Introduction

The causes of obesity are complex and multifaceted. Obesity control interventions usually focus on a combination of physical and dietary aspects of social, economic and cultural environments together with individual approaches (1, 2). Personal weight control efforts (i.e., intentionally trying to lose or maintain weight) are of particular relevance for public health as they reflect an active investment of the population and provide an opportunity to guide individuals to evidence-based weight control approaches.

In other areas of public health (e.g., smoking cessation), a focus on personal behavior change attempts (e.g., quit smoking) has been key to understanding and enhancing effects of public health strategies (3). The relationship between personal weight loss attempts and obesity is complex and well-informed attempts to lose weight (e.g., those utilizing evidence-based weight loss strategies) may result in better weight loss and maintenance (1, 4). However, there is also consistent evidence that amongst obese adults the number of weight loss attempts is a negative predictor of success in weight loss interventions (5). Recurrent weight control efforts may negatively impact on self-concept, body image, pessimistic attributions, and feelings of helplessness, all of which could predispose individuals to failure (6, 7). Therefore, it is important to understand *how many* weight control attempts are made, by *whom*, *how* and *why*, in order to provide a clearer knowledge base about what people seeking weight control are currently doing (and why) and inform public health policies and interventions regarding changes that need to occur in weight loss/maintenance attempts to improve population outcomes.

This systematic review and meta-analysis aimed to 1) synthesize the available epidemiological data on the prevalence of weight control (weight loss and weight maintenance) attempts among adults worldwide, 2) provide a comprehensive description of the personal strategies used and 3) describe the motives behind those attempts. To our knowledge, this is the first study providing such a perspective.

Methods

This systematic review and meta-analysis is reported in accordance with *The Joanna Briggs Institute Reviewers' Manual 2014* for systematic reviews of prevalence and incidence data (8). Methodological aspects of this review were specified in advance and

documented in a protocol (PROSPERO registration number: CRD42014010572; see Appendices).

Eligibility Criteria

Studies were selected for this review if they were population-based epidemiological/observational studies that included samples of adults (≥18 years old). To be eligible, studies should also include a question on the prevalence of weight control (loss and/or maintenance[2]) attempts within a 12-month period preceding the survey (e.g., "Are you currently trying to lose weight?", "Have you tried to lose weight in the past 6 months?", "Have you tried to lose weight in the last year?", "Are you now trying to maintain your weight, that is, to keep from gaining weight?", "Have you tried to keep from gaining weight during the previous 12 months?"). Past year prevalence was chosen instead of ever prevalence because it has a greater potential to reflect changing patterns over time and capture differences (e.g., between geographical regions). Studies of pregnant women (or women within 1-year postpartum), athletes and populations with specific health conditions, disabilities or mental disorders were excluded.

Search Strategy and study selection

A comprehensive search of peer-reviewed articles was conducted in three electronic databases: PubMed, PsycInfo and Web of Science (all articles published until December 2015). Searches included various combinations of the following terms: weight control, weight loss, weight maintenance, diet, attempts, prevalence, strategies, practices, determinants, and motives (Full search strategy is available from the authors upon request). The search was limited to studies with participants aged 18 years and older. There were no restrictions regarding the language of publication. Additionally, manual cross-referencing of retrieved articles and hand-searches of key scientific journals (e.g., *International Journal of Public Health*, *American Journal of Preventive Medicine*) were performed.
Potentially eligible studies were independently identified by two authors (IS, EVC), based on titles, abstracts and references. Duplicate entries were removed. Relevant articles were then retrieved for a full-text review. The same two researchers independently reviewed the full-text of potential studies and discrepancies were resolved by consensus. Endnote® X7 for Mac® OS X® was used to manage the references.

[2] Maintenance does not necessarily imply previous weight loss.

Methodological quality

The methodological quality of included studies was assessed using a standardized form based on a short version of *The Joanna Briggs Institute critical appraisal checklist for studies reporting prevalence data* (8), consisting of a 5-category tool addressing critical issues of internal and external validity of prevalence data, including 1) representativeness of the sample, 2) appropriate recruitment of study participants, 3) adequacy of sample size, 4) non-response and refusals, and 5) use of a standard criteria for the measurement of the condition. For each study, each category of the checklist was classified as *Yes*, *No*, *Unclear* or *Not applicable. No* corresponds to a limitation in the respective methodological category. Two of three researches (IS, MM, and EVC) independently assessed the methodological quality of each study and discussed the results of their critical appraisals. Disagreements were resolved by consensus.

Data Extraction

The Joanna Briggs Institute data extraction form for prevalence and incidence studies (8) was used to extract relevant information. Data extraction included information about 1) study details (authors, year, publication journal), 2) study methods (design, mode of data collection, year of survey, geographical region, setting), 3) subject characteristics (sample size, age, gender, percentage of overweight/obesity, response rate), and 4) outcomes of interest (prevalence of weight loss and maintenance attempts, strategies used and motives reported by those trying to control their weight).

Data Synthesis and Statistical Analyses

We conducted separate meta-analyses for the prevalence of weight loss and weight maintenance attempts in (a) general populations and (b) ethnic-minority populations. Analyses were conducted using the Comprehensive Meta-Analysis Software version 2.2 (9). Meta-analyses were conducted using random-effects models, in which the summary effect is an estimate of the mean of a distribution of effect sizes (10). Pooled effects were the prevalence estimates of weight loss and maintenance attempts (represented as event rate plus confidence intervals). To evaluate the amount of variation in the effects of included studies, we inspected for heterogeneity using: 1) the Cochran's Q statistic (11), for which a significant p-value (<0.05) demonstrates that studies do not share a common effect size (i.e., there is heterogeneity in the effect sizes between studies); and 2) I^2 statistic

(12) that assesses the proportion of observed dispersion that is due to real differences in the actual effect sizes (rather than sampling error). The I^2 ranges from 0 to 100%, where a value of 0% indicates no observed heterogeneity and values of 25%, 50% and 75% reflects low, moderate and high heterogeneity, respectively.

Subgroup analyses were conducted to examine whether prevalence estimates varied according to the decade of the survey (1970-1979, 1980-1989, 1990-1999, 2000-2009 and 2010-2015) and the geographic region where the survey took place (coded according with the World Bank Atlas as Africa, East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, North America, and South Asia). These subgroup analyses were conducted using mixed-effect models (i.e., random-effects model is conducted within subgroups and a fixed effect model was used across subgroups) (10). Between-groups Q statistic and corresponding p-values was used to compare the mean effect across subgroups. Further, meta-regressions using mixed-effects models were conducted to analyze the moderation effect of the following continuous variables: 1) percentage of overweight and obese individuals in the sample, 2) percentage of women in the sample, and 3) mean age of the sample. Meta-regressions were conducted when there were at least 10 studies/analyses and were analyzed based on the Z-value and associated p-value of the slope (10). Due to the limited number of studies reporting the prevalence of weight maintenance attempts, we only conducted moderator analyses for the prevalence of weight loss attempts.

Some studies did not provide separated prevalence rates of weight loss and maintenance attempts and did not include sufficient data (e.g., mean age) for subgroup analyses and meta-regression. Therefore, the number of studies included in moderation analyses varies.

Personal weight control strategies and motives reported by those trying to control their weight in the past year were qualitatively synthetized and presented in tabular form. Personal weight control strategies were independently classified within the domains of the Oxford Food and Activity Behaviors (OxFAB) Taxonomy (13) by two of three researchers (IS, MM, and EVC) and discrepancies were resolved by consensus. This taxonomy was chosen because it is a comprehensive tool to systematically describe the cognitive and behavioral strategies used by individuals for weight management (13). Only the domains where at least one strategy fell on were shown. Two additional domains were included - dietary choices and extreme strategies – as some of the reported strategies did not fit within any existing domain. Likewise, some strategies seemed to fit in more than one domain;

nevertheless, we have selected the one that appeared more appropriate. Weight control motives were independently extracted by two of three researchers (IS, MM, and EVC).

Sensitivity analyses

Sensitivity analyses were carried out to explore if overall results were affected by methodological quality. Primary analyses were repeated excluding studies presenting methodological limitations in either and in all (cumulative) categories of the *The Joanna Briggs Institute critical appraisal checklist for studies reporting prevalence data* (8). Moderation analyses were also repeated excluding all studies presenting methodological limitations.

Publication bias was examined by 1) visual inspection of funnel plot and asymmetry and 2) Egger's test (14) to confirm the visual impression.

Results

The literature search yielded a total of 9,759 records. Sixteen articles identified through manual searches and cross-referencing were added, leading to a total of 9,775 potential articles (Figure 1). After duplicates removal (n=3,818), 5,957 articles were assessed for eligibility. Of these, 5,781 were excluded based on title/abstract screening, leaving 176 eligible for full-text screening. Seventy-two articles with a total sample size of 1,184,942 met eligible criteria and were included.

Study and sample characteristics

Characteristics of included studies are summarized in Table 1. Sixty studies were conducted within general populations and 12 within ethnic-minority populations. Most studies had a cross-sectional design (k = 67), and the remaining 5 studies were prospective cohorts. Surveys were conducted between 1975 and 2013 across forty countries within five continents, and data was collected via in-person/self-administered (k = 41), telephone (k = 17), mail (k = 11), and online (k = 3) surveys. Sixty-two studies included mixed-gender samples, 9 included only women and 1 study was conducted only with men. Eleven studies targeted overweight and obese individuals only. Sample sizes in the studies ranged from 123 to 170,971 participants and response rates from 24% to 97.7%.

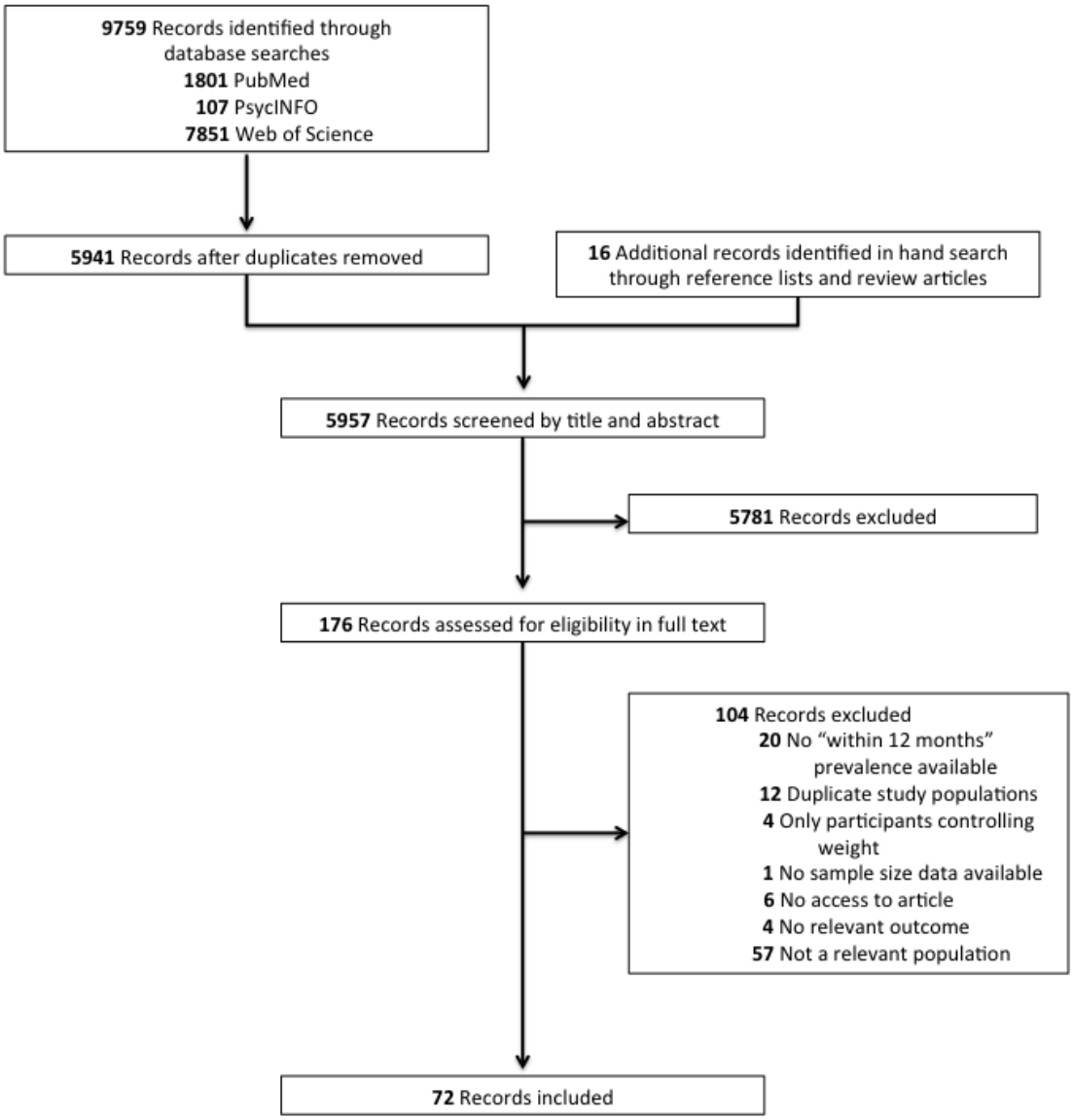


Figure 1. Flow diagram of studies.

Methodological appraisal

Table 1 shows the limitations regarding methodological quality of the included studies. In 22 (general population: 14; ethnic minorities: 8) of the 72 included studies, the population was not representative of the country, region or setting where the studies were conducted (Category 1). In 15 studies (general population: 8; ethnic minorities: 7), participants were not randomly selected and/or were not recruited from an appropriate source (Category 2). Sample size calculation (Category 3) was not performed in 25 studies (general population: 16; ethnic minorities: 9). Furthermore, in 23 studies (general population: 16; ethnic minorities: 7) there was no information on response/refusals rate and/or no comparison between responders and non-responders (Category 4). All studies

Table 1. Studies on the prevalence of weight control attempts sorted by country

								Prevalence of weight control attempts (%)				
Reference	**Study design**	**Data collection**	**Year of survey**	**Population**	**Sample size /% women**	**Age (range; mean ± SD (years))**	**%Overweight[A] /Obesity[B]**	**Trying to lose**	**Trying to maintain[D]**	**Total**	**Response rate (%)**	**Methodological limitations (categories)**
(a)												
(42)	PCS	MS	1993	Australia reg.	n = 1342/50.4	≥ 18; -	38.2/15.9	20.4	22.2	42.6	67.8	-
(43)	CSS	MS	1997	Australia reg.	n = 900/57.9	≥ 18; 44.7 ± 16.5	30.0/12.7	22.9*	26.3*	49.2*	41.6	[3]
(44)	CSS	IS	2004	Australia spec.[a]	n = 1973/58.0	≥ 18; -	33.4/23.2	37.0	-	-	-	[4]
(45)	PCS	MS	2007-2008	Australia spec.[b]	n = 1634/100	18-46; 36.5 ± 7.6	-	39.1	29.9	69.0	45.0	[3, 4]
(46)	CSS	OS	2010-2011	Australia spec.[a]	n = 1335/60.9	≥ 18; -	35.4/22.8	50.0	-	-	85.0	[1, 3]
(47)	CSS	IS/MS	-	Australia spec.[c]	n = 994/54.0	≥ 18, -	28.4/8.4	46.9	-	-	65.4	[4]
(15)	CSS	IS	2013	Bangladesh spec.[d]	n = 649/-	16-30; 20.8 ± 2.8	34.2[C]	32.1***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Barbados spec.[d]	n = 577/-	16-30; 20.8 ± 2.8	40.0[C]	11.4***	-	-	-	[1, 3]
(19)	CSS	MS	2001	Belgium nat.	n = 2591/62.6	18-74; -	23.4/9.8	-	-	46.4	-	-
(48)	CSS	IS	2010	Brazil reg.	n = 2732/57.9	≥ 20; 46.1 ± 17.0	36.3/26.0	26.6*	-	-	89.3	-
(49)	CSS	IS	1986-1992	Canada nat.	n = 17564/50.9	18-74; -	34.3/15.4	32.6*	-	-	66.5	-
(50)	CSS	OS	2008	Canada spec.[d]	n = 3069/74.8	-; 27.9 ± 10.2	25.6[C]	33.3	-	-	-	[1, 2, 3, 4]
(15)	CSS	IS	2013	Colombia spec.[d]	n = 810/-	16-30; 20.8 ± 2.8	25.5[C]	18.8***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Egypt spec.[d]	n = 696/-	16-30; 20.8 ± 2.8	41.6[C]	20.5***	-	-	-	[1, 3]
(51)	CSS	IS	1997-1998/2002	England nat.	n = 9098/48.1	25-60; -	100[C]	66.5*	-	-	-	-
(52)	PCS	MS	1975	Finland nat.	n = 7729/54.3	18-54; -	-	18.6*	-	-	89.0	[4]
(53)	CSS	IS	1990-1991	France spec.[d]	n = 656/55.6	18-30; 21.4 ± 2.5	1.8/0.3	23.8	-	-	82.0	[1, 2, 3, 4]
(54)	CSS	IS	1999	Great Britain nat.	n = 1894/50.5	-; 45.8 ± 18.2	32.3/10.8	28.5	36.4	64.9	70.0	[4]
(55)	CSS	IS	2012	Great Britain nat.	n = 810/46.7	16-90; 51.3 ± 17.9	65.2/34.8	45.0	-	-	-	-
(15)	CSS	IS	2013	India spec.[d]	n = 800/-	16-30; 20.8 ± 2.8	36.8[C]	16.4***	-	-	-	[1, 3]
(19)	CSS	MS	2001	Italy nat.	n = 1062/42.4	18-74; -	29.2/6.8	-	-	46.5	-	-
(15)	CSS	IS	2013	Ivory Coast spec.[d]	n = 777/-	16-30; 20.8 ± 2.8	11.7[C]	18.1***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Jamaica spec.[d]	n = 675/-	16-30; 20.8 ± 2.8	27.9[C]	14.3***	-	-	-	[1, 3]
(56)	CSS	IS	1998	Japan spec.[e]	n = 146/0	30-65; 47.5 ± 9.3	30.8[C]	32.2	-	-	80.1	[1, 2, 3, 4]
(15)	CSS	IS	2013	Kyrgyzstan spec.[d]	n = 814/-	16-30; 20.8 ± 2.8	9.2[C]	23.1***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Laos spec.[d]	n = 759/-	16-30; 20.8 ± 2.8	20.6[C]	9.5***	-	-	-	[1, 3]
(57)	CSS	IS	2001	Lebanon spec.[d]	n = 2013/60.0	-; 21.0 ± 2.4	18.0[C]	30.0	-	-	90.0	[1, 3]
(15)	CSS	IS	2013	Madagascar spec.[d]	n = 780/-	16-30; 20.8 ± 2.8	5.1[C]	21.6***	-	-	-	[1, 3]
(16)	CSS	IS	2009	Malaysia spec.[e]	n = 233/55.4	18-60; 32.5 ± 10.5	29.6/20.6	73.8	-	-	70.6	[4]
(58)	CSS	IS	-	Malaysia spec.[f]	n = 1032/62.8	≥ 18; -	-	24.5	-	-	-	[1, 2, 3, 4]
(15)	CSS	IS	2013	Mauritius spec.[d]	n = 461/-	16-30; 20.8 ± 2.8	13.0[C]	16.4***	-	-	-	[1, 3]
(59)	CSS	IS	2004	Mexico spec.[d]	n = 2651/62.0	17-45; 20.2 ± 2.6	28.9[C]	38.8	-	-	-	[1, 3, 4]

(15)	CSS	IS	2013	Namibia spec.[d]	n = 466/-	16-30; 20.8 ± 2.8	19.3[C]	16.4***	-	-	-	[1, 3]
(18)	CSS	MS	2009	New Zealand nat.	n = 1601/100	40-50; 45.5 ± 3.2	29.4/20.7	39.4	42.1	81.5	65.8	-
(15)	CSS	IS	2013	Nigeria spec.[d]	n = 800/-	16-30; 20.8 ± 2.8	13.3[C]	12.7***	-	-	-	[1, 3]
(60)	PCS	MS	1997	Norway nat.	n = 10025/100	45-59; -	31.0/8.0	51.6	-	-	51.2	[2]
(15)	CSS	IS	2013	Pakistan spec.[d]	n = 761/-	16-30; 20.8 ± 2.8	15.0[C]	27.7	-	-	-	[1, 3]
(15)	CSS	IS	2013	Philippines spec.[d]	n = 769/-	16-30; 20.8 ± 2.8	22.5[C]	24.5***	-	-	-	[1, 3]
(19)	CSS	MS	2001	Portugal nat.	n = 1313/55.4	18-74; -	32.9/9.3	-	-	37.0	-	-
(61)	CSS	TS	2012	Portugal nat.	n = 1098/48.5	18-65; 40.1 ± 13.3	34.0/10.8	24.3	19.4	43.7	57.9	-
(15)	CSS	IS	2013	Russia spec.[d]	n = 785/-	16-30; 20.8 ± 2.8	17.0[C]	22.0***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Singapore spec.[d]	n = 678/-	16-30; 20.8 ± 2.8	22.1[C]	26.8***	-	-	-	[1, 3]
(15)	CSS	IS	2013	South Africa spec.[d]	n = 749/-	16-30; 20.8 ± 2.8	30.7[C]	15.3***	-	-	-	[1, 3]
(19)	CSS	MS	2001	Spain nat.	n = 3543/52.6	18-74; -	33.5/11.6	-	-	43.3	-	-
(62)	CSS	IS	2012	Thailand spec.[d]	n = 860/72.7	18-25; 20.1 ± 1.3	7.8/13.0	42.5	-	-	97.3	[1, 3]
(15)	CSS	IS	2013	Thailand spec.[d]	n = 785/-	16-30; 20.8 ± 2.8	20.8[C]	29.0***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Tunisia spec.[d]	n = 961/-	16-30; 20.8 ± 2.8	26.3[C]	23.8***	-	-	-	[1, 3]
(15)	CSS	IS	2013	Turkey spec.[d]	n = 795/-	16-30; 20.8 ± 2.8	18.7[C]	22.5***	-	-	-	[1, 3]
(63)	CSS	MS	1985[Ŧ]	US nat.	n = 170971/52.8	≥ 18; -	23.9[C]	35.0	-	-	-	-
(64)	CSS	TS	1985-1988[ŦŦ]	US nat.	n =117827/50.8	≥ 18; -	20.0[C]	38.6*	-	-	-	-
(65)	CSS	IS	1987-1988	US spec.[e]	n = 4647/54.7	≥ 18; 37.9 ± 0.21	-	19.7	-	-	75.0	[1, 3]
(66)	CSS	IS	1988-1994[ŦŦŦ]	US nat.	n = 13092/51.9	≥ 20; 45.7 ± 0.83	-	45.9	-	-	-	-
(67)	CSS	TS	1989[ŦŦ]	US nat.	n = 64637/56.6	≥ 18; 45.0 (no SD)	-	33.5*	28.2*	61.7*	82.0	-
(64)	CSS	TS	1989/1991-1992	US nat.	n = 114025/-	≥ 18; -	23.3[C]	33.7*	-	-	-	-
(68)	CSS	IS	1990	US nat.	n = 31347/-	≥ 25; -	-	31.7*	-	-	86.3	-
(69)	CSS	TS	1991	US nat.	n = 7805/-	≥ 18; -	-	19.3	-	-	72.0	-
(70)	CSS	TS	1991	US reg.	n = 2072/61.5	≥ 18; -	-	34.4*	-	-	82.4	-
(71)	CSS	IS	1994-1998	US reg.	n = 123/73.2	18-70; -	67.0[C]	48.8	-	-	29.0	-
(72)	CSS	TS	1996[ŦŦ]	US nat.	n = 107804/50.4	≥ 18; -	-	36.4*	33.7*	70.1*	-	-
(73)	CSS	TS	1996	US reg.	n = 3010/61.0	≥ 18; -	59.0[C]	38.0	-	-	60.5	-
(74)	CSS	TS	1996-1997	US nat.	n = 1760/100	≥ 40; -	52.8/47.2	64.8	-	-	87.3	-
(75)	CSS	IS	1997-1998	US reg.	n = 3832/62.0	≥ 18; 43.5 ± 15.6	-	-	-	52.7	66.0	-
(76)	CSS	IS	1998[Ŧ]	US nat.	n = 30433/55.5	≥ 18; -	-	30.9*	-	-	73.9	-
(77)	CSS	TS	1999	US reg.	n = 1232/-	≥ 20; -	-	36.1*	34.1*	70.2*	-	-
(78)	CSS	TS	1999-2002[ŦŦŦ]	US nat.	n = 5608/48.3	≥ 20; 51.5 (no SD)	53.6/46.4	51.2	-	-	-	-
(79)	CSS	TS	2000[ŦŦ]	US nat.	n = 164187/57.6	≥ 18; -	36.4/20.7	39.5*	-	-	48.9	-
(80)	CSS	IS	2000[Ŧ]	US nat.	n = 17317/52.0	≥ 18; -	35.0/18.0	30.0	21.0	51.0	83.0	-
(17)	CSS	IS	2001-2002[ŦŦŦ]	US nat.	n = 4354/49.3	≥ 20; -	37.3/30.2	40.9	10.4	51.3	81.0	-
(32)	CSS	IS	2001-2006[ŦŦŦ]	US nat.	n = 4021/-	≥ 20; -	0.0/100	63.0	-	-	-	-
(81)	CSS	IS	2002	US spec.[a]	n = 210/74.0	-; 52.0 (no SD)	8.0/92.0	49.8	-	-	97.7	[1, 2, 3, 4]
(82)	CSS	IS	2002-2003	US spec.[d]	n = 38204/65	18-25; 20.3 ± 1.71	21.0/7.0	49.8	23.4	73.2	57.0	[1, 3, 4]
(83)	CSS	MS	2003	US nat.	n = 3771/59.4	≥ 18; -	35.0/32.5	58.0	-	-	69.0	-
(84)	CSS	TS	2003[ŦŦ]	US nat.	n = 111456/52.9	≥ 20; 51.8 ± 14.5	60.1/39.9	55.7	-	-	-	-

(85)	CSS	IS	2003-2006[ŦŦŦ]	US nat.	n = 4784/46.6	≥ 20; 48.1 ± 0.51	100[C]	47.4	-	-	-	-
(26)	CSS	IS	2003-2008[ŦŦŦ]	US nat.	n = 16720/51.0	≥ 18; -	33.5/32.7	37.0	11.4	48.4	-	-
(86)	CSS	IS	2005	US spec.[e]	n = 813/79.0	18-65; -	32.0/35.2	62.7	-	-	56.0	[1, 3, 4]
(87)	CSS	IS	2005-2008[ŦŦŦ]	US nat.	n = 5474/47.2	20-64; -	47.5/52.5	50.2*	-	-	-	-
(88)	CSS	IS	2007-2010[ŦŦŦ]	US nat.	n = 9569/51.0	≥ 20; -	35.0/33.0	43.0	-	-	-	-
(89)	CSS	TS/MS	2008[ŦŦŦŦ]	US nat.	n = 7059/50.8	≥ 18; 46.1 (no SD)	34.4/27.8	53.4*	-	-	31.0	-
(90)	CSS	IS	2009	US spec.[a]	n = 3949/65.3	≥ 18; 39.9 ± 0.88	28.8/47.5	60.1**	-	-	71.0	[2]
(91)	CSS	MS	2009-2010	US spec.[g]	n = 1510/74.0	≥ 18; -	26.0/46.0	51.0	-	-	24.0	[4]
(92)	PCS	MS	2012[ŦŦŦŦ]	US nat.	n = 3407/49.8	≥ 18; -	-	52.0*	24.0*	76.0*	40.0	-
(93)	CSS	OS	-	US nat.	n = 4023/100	25-45; 35.2 ± 5.9	-	67.2	-	-	-	-
(94)	CSS	IS	-	US spec.[a]	n = 414/66.3	19-79; 55.0 ± 15.4	0.0/100	73.0	-	-	-	[1, 2, 3, 4]
(15)	CSS	IS	2013	Venezuela spec.[d]	n = 444/-	16-30; 20.8 ± 2.8	20.5[C]	19.2***				[1, 3]
(b)												
(95)	CSS	IS	2001-2003	Holland reg.	n = 1441/58.8	35-60; 45.4 ± 6.5	62.4/24.8	38.8*	12.9*	51.7*	60.0	[1, 3]
(96)	CSS	IS	2002	Norway, reg.	n = 629/42.3	30-60; 42.4 (no SD)	49.1/15.5	27.5*	-	-	44.0	-
(97)	CSS	TS	1990	US reg.	n = 1445/67	≥ 18; 45.2 ± 18.1	43.8[C]	66.0**	-	-	81.1	-
(98)	CSS	IS	1992-1993	US reg.	n = 1143/100	24-42; 31.6 ± 3.8	-	9.9*	-	-	-	-
(99)	CSS	TS	1994	US reg.	n = 244/55.7	≥ 18; -	-	41.9	-	-	91.1	[3]
(100)	CSS	IS	1985	US spec.[e]	n = 500/100	25-65; 40.6 ± 10.1	39.0	40.0	-	-	-	[1, 2, 3, 4]
(101)	CSS	TS	2003	US spec.[h]	n = 572/71.2	≥ 18; 53.9 ± 15.7	-	49.4	-	-	56.8	[1, 2, 3, 4]
(102)	CSS	IS	2003	US spec.[d]	n = 392/69.0	-; 23.7 ± 5.5	28.6/15.6	38.3	-	-	-	[1, 2, 3, 4]
(103)	CSS	IS	2003-2004	US spec.[i]	n = 585/49.0	≥ 18; 45.9 (no SD)	100[C]	58.0	-	-	-	[1, 2, 3, 4]
(104)	CSS	IS	2009	US spec.[i]	n = 413/100	≥ 18; 35.6 ± 14.7	25.0/41.0	59.0	-	-	-	[1, 2, 3, 4]
(105)	CSS	IS	-	US spec.[i]	n = 203/100	20-64; 33.8 (no SD)	65.7[C]	29.1	40.4	69.5	-	[1, 2, 3, 4]
(106)	CSS	IS	-	US spec.[i]	n = 219/58.0	-; 31.0 (no SD)	55.5[C]	33.3	41.1	74.4	-	[1, 2, 3, 4]
Sample size weighed mean								39.1	30.3	66.6		
Only (a)								38.6	30.3	66.7		
Only (b)								41.7	19.2	56.3		

[A]Body mass index ≥ 25 and <30 kg/m^2 (≥ 23 and <25 kg/m^2 for (14, 70)); [B]Body mass index ≥30 kg/m^2 (≥25 kg/m^2 for (14, 70)) or 120% of ideal body weight; [C]Overweight plus Obesity; [D]Or avoid gaining weight

(a) General population studies; **(b)** Ethnic-minority population studies

CSS = cross sectional survey; PCS = prospective cohort study; IS = in-person/self-administered survey; MS = mail survey; OS = online survey; TS = telephone survey; nat. = national representative data; reg. = regional representative data; spec. = specific setting data

[a]Patients from Health/Primary Care Centers; [b]Individuals from low socioeconomic areas; [c]Individuals from high and low socioeconomic areas; [d]University students/community; [e]Workers/employees; [f]Stationary individuals in a shopping center; [g]Patients covered by National Healthcare Insurance; [h]Members of religious congregations; [i]Members of the community at large

*Estimated percentages based on the data available; **Prevalence reported only for overweight and obese individuals; ***Prevalence reported only for underweight and normal weight individuals

[Ŧ]Data from the National Health Interview Survey (NHIS); [ŦŦ]Data from the Behavioral Risk Factor Surveillance System (BRFSS); [ŦŦŦ]Data from the National Health and Nutrition Examination Survey (NHANES); [ŦŦŦŦ]Data from the Health Information National Trends Survey (HINTS)

[1]Sample was not representative; [2]Participants were not recruited from an appropriate source and/or no random selection was used to recruit them; [3]No sample size calculation; [4]No information on non-response/refusals and/or no comparison between responders and non-responders was made (if there was oversampling and data was weighed to reflect country/region population estimates, we assumed that non-response was taken into account);
Limitations of the studies were determined with The Joanna Briggs Institute Critical Appraisal Checklist for Studies Reporting Prevalence Data (8).

presented a standard criterion for the measurement of weight control attempts and therefore none presented limitations in this regard (Category 5).

Prevalence of weight control attempts

Prevalence rates of weight *loss* and weight *maintenance* attempts varied widely across studies, ranging from 9.5% (15) to 73.8% (16) and 10.4% (17) to 42.1% (18), respectively (Table 1). Five studies did not report separate prevalence rates of weight loss and maintenance attempts. The overall prevalence of weight control (i.e., loss plus maintenance) attempts ranged between 37% (19) and 81.5% (18).

General population studies. The overall summary prevalence of weight *loss* and *maintenance* attempts in general populations was 34.6% (95% CI [32.7%, 36.5%]; Q = 36355, $p < 0.001$; $I^2 = 99.8\%$) and 24.7% (95% CI [23.7%, 31.7%]; $Q = 5737$, $p < 0.001$; I^2 = 99.8%), respectively. *Sensitivity analysis* showed that excluding studies with limitations in categories 1 and 3 led to substantial changes in the overall prevalence estimates of weight *loss* attempts in general populations: +7.0% (k = 44) and +7.5% (k = 42), respectively. Excluding studies with limitations in categories 2 and 4 led to minimal changes: -0.9% (k = 50) and -1.7% (k = 42), respectively. Figure 2 presents the overall results excluding all studies with limitations in any methodological category. The pooled estimate for the prevalence of weight *loss* attempts in general populations was 41.5% (95% CI [38.7%, 44.4%]; $Q = 27947$, $p < 0.001$; $I^2 = 99.9\%$; k = 34).

For the overall prevalence estimates of weight *maintenance* attempts in general populations, excluding studies with limitations led to minimal changes (from -1.5% to +0.1%). The combined estimate excluding studies with limitations in any methodological category was 23.2% (95% CI [18.8%, 28.3%]; $Q = 4838$, $p < 0.001$; $I^2 = 99.8\%$; k = 10). Regarding *publication bias*, visual inspections of the funnel plots didn't show the presence of asymmetry, which was confirmed with Egger's test (all $p > 0.05$), either for the prevalence of weight *loss* or *maintenance* attempts in general populations.

Table 2 presents the results of the subgroup analyses. A clear significant increase in the prevalence of weight loss attempts across decades is observed (from 18.6% to 47.7%, $Q = 138.454$, $p < 0.001$), until the decade of 2000-2009. Between 2010 and 2015 the combined prevalence was 24.1%. High heterogeneity and large proportion of dispersion in the prevalence rates was observed within subgroups (I^2 varied between 98.8% and 99.8%). *Sensitivity analysis* showed that excluding studies with any methodological limitation led

to important changes in the overall prevalence estimates of weight *loss* attempts in the decade of 2010-2015 (increased to 39.7%). For the other decades, changes were small.

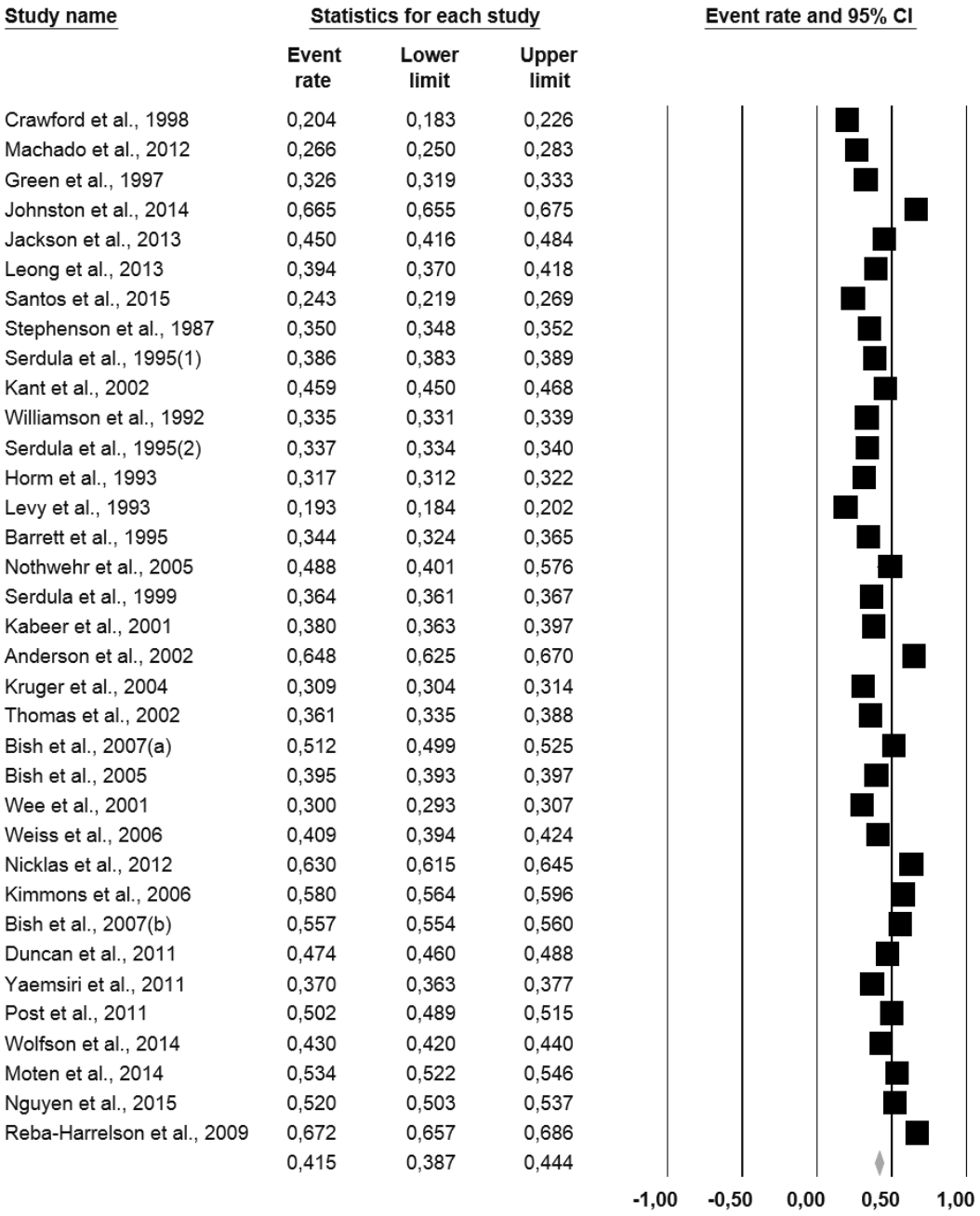


Figure 2. Forest plot for prevalence estimates of weight loss attempts in general populations excluding studies with methodological limitations (k = 34).

Table 2. Subgroup analysis assessing the effect of pre-selected moderators on the prevalence of weight loss attempts in general populations

Moderators	**N analyses**	**Prevalence (%) [95% CI]**	***Q*[a]**	***p*[a]**	***I*² (%)**
Decade of survey			138.454	<0.001	
1970-1979	1	18.6 [17.7, 19.5]			0.0
	0	**-**			**-**
1980-1989	4	35.8 [35.6, 35.9]			99.7
	3	**35.9 [35.8, 36.1]**			**99.7**
1990-1999	18	34.4 [31.0, 37.9]			99.6
	13	**35.5 [31.7, 39.4]**			**99.6**
2000-2009	24	47.7 [44.4, 50.9]			99.8
	14	**48.2 [44.2, 52.2]**			**99.9**
2010-2015	29	24.1 [21.9, 26.4]			98.8
	4	**39.7 [38.6, 40.9]**			**99.4**
Geographic region			108.335	<0.001	
Africa	6	16.6 [12.7, 21.4]			79.5
	0	**-**			**-**
East Asia and Pacific	15	33.1 [28.9, 37.6]			98.3
	2	**31.7 [30.0, 33.4]**			**99.2**
Europe and Central Asia	10	31.5 [26.6, 36.8]			99.8
	3	**61.3 [60.4, 62.3]**			**99.7**
Latin America and the Caribbean	6	20.6 [15.9, 26.1]			98.5
	1	**26.6 [25.0, 28.3]**			**0.0**
Middle East and North Africa	3	26.8 [25.4, 28.2]			93.1
	0	**-**			**-**
North America	37	44.0 [41.0, 47.1]			99.9
	29	**42.6 [39.6, 45.7]**			**99.9**

South Asia	3	25.6 [23.8, 27.5]			96.1
	0	**-**			**-**

Meta-regressions	*N analyses*	*Slope, SE [95% CI]*	*Z*	*p*
% Overweight and obesity	70	0.018, 0.001 [0.016, 0.020]	14.869	<0.001
	26	**0.015, 0.002 [0.011, 0.018]**	**8.727**	**<0.001**
% Women	58	0.011, 0.003 [0.004, 0.017]	3.260	0.001
	30	**0.012, 0.004 [0.003, 0.020]**	**2.625**	**0.009**
Mean age	48	0.038, 0.007 [0.024, 0.051]	5.490	<0.001
	11	**0.001, 0.034 [-0.067, 0.068]**	**0.020**	**0.984**

[a]Cochran's *Q* statistic and *p*-values correspond to subgroup differences in effects. Results from sensitivity analyses are represented in bold.

There were significant differences in the prevalence of weight loss attempts between geographic regions *(Q* = 108.335, $p < 0.001$), in which the highest overall prevalence was found in North America (44%, 95% CI [41%, 47.1%]) and the lowest in Africa (16.6%, 95% CI [12.7%, 21.4%]) (Table 2). All subgroups presented significant heterogeneity and large proportion of dispersion in the prevalence rates (I^2 varied between 93.1% and 99.9%). *Sensitivity analysis* showed that the prevalence of weight loss attempts in Europe and Central Asia and in Latin America and the Caribbean, excluding studies with any methodological limitation, was much higher: from 31.5% to 61.3% and from 20.6% to 26.6%, respectively. Slight changes were observed in East Asia and Pacific and in North America (-1.4%).

Combined prevalence of weight loss attempts increased significantly with the prevalence of overweight and obesity (b = 0.018; $p < 0.001$), with the percentage of women in the samples (b = 0.011; $p = 0.001$), and with mean age (b = 0.038; $p < 0.001$). *Sensitivity analysis* showed that when excluding all the studies with methodological limitations, only the association between weight loss attempts and mean age became non significant.

Ethnic-minority population studies. Overall results of the meta-analysis for the prevalence of weight *loss* attempts in ethnic minorities showed a pooled estimate of 39.6% (95% CI [29.7%, 50.4%]; $Q = 867.199$, $p < 0.001$; $I^2 = 98.7\%$). Combined prevalence of weight *maintenance* attempts was 21.1% (95% CI [19.2%, 23.2%]; $Q = 147583$, $p < 0.001$; $I^2 = 98.6\%$). *Sensitivity analysis* showed that excluding all studies with methodological limitations led to an increase in the overall prevalence of weight *loss* attempts of 4.5% (44.1%; k = 3). All of the studies reporting *maintenance* attempts presented methodological limitations.

Subgroup analyses by decade of survey showed a prevalence of weight loss attempts of 40% between 1980-1989, 48.5% between 1990-1999 and 44.9% between 2000-2009 (Table 3). Subgroup analyses by geographic region revealed a prevalence of weight loss attempts of 35.6% in Europe and Central Asia and 41% in North America (Table 3). For both analyses, there were no significant differences between groups (Q = 0.415, $p = 0.813$ and $Q = 0.305$, $p = 0.581$, respectively). Meta-regressions by mean age and percentage of women in the samples were also not significant (b = 0.042; $p = 0.118$ and b = -0.009; $p = 0.440$, respectively). Since only 3 studies did not present

Table 3. Subgroup analysis assessing the effect of pre-selected moderators on the prevalence of weight loss attempts in ethnic-minority populations

Moderators	**N analyses**	**Prevalence (%) [95% CI]**	***Q*[a]**	***p*[a]**	***I*² (%)**
Decade of survey			0.415	0.813	
1980-1989	1	40.0 [35.8, 44.4]			99.7
1990-1999	3	48.5 [46.3, 50.7]			99.6
2000-2009	6	44.9 [28.1, 62.8]			99.8
Geographic region			0.305	0.581	
Europe and Central Asia	2	35.6 [33.5, 37.7]			95.9
North America	10	41.0 [29.5, 53.5]			98.8
Meta-regressions	*N analyses*	*Slope, SE [95% CI]*	*Z*	*p*	
% Women	12	-0.009, 0.011 [-0.030, 0.013]	-0.771	0.440	
Mean age	11	0.042, 0.027 [-0.011, 0.095]	1.561	0.118	

[a]Cochran's *Q* statistic and *p*-values correspond to subgroup differences in effects.

methodological limitations, we did not conduct *sensitivity analyses* for this set of moderation analyses.

Personal weight control strategies

Twenty-seven studies (25 general population studies and 2 ethnic-minority population studies) reported strategies used by those trying to control their weight (Table 4). Thirty-seven strategies were identified across studies, which were grouped in 10 domains of the OxFAB Taxonomy. Doing or increasing physical activity – the only strategy that fell in the *energy compensation* domain - was the most frequently assessed strategy (k = 27 for trying to *lose* and k = 7 for trying to *maintain* weight) and results show this strategy was used by the majority of participants across studies. Dieting – within the *restraint* domain – was the second most assessed strategy for trying to *lose* weight (k = 20) and was even more frequently reported: more than two-thirds of participants attempted to lose weight using this strategy. All other strategies were assessed by 1 to 14 studies. The domain that combined more strategies was the *regulation – restrictions* (k ranged between 1 to 9)*:* from 12% to 66% of participants and from 2% to 64% of participants reported avoiding or restricting specific foods or behaviors for trying to *lose* and *maintain* weight, respectively. *Dietary choices* (k = 1 - 4) and *weight management aids* (k = 1 - 14) were the other domains were more strategies fell on: from 39% to 85% of participants reported choosing specific dietary behaviors and from 1% to 25% of participants reported using some aid to try to *lose* weight; from 36% to 87% of participants reported choosing specific dietary behaviors and from 1% to 6% of participants reported using some aid to try to *maintain* weight.

Weight control motives

Of the 72 included studies, only 7 from general populations reported motives for trying to lose and/or maintain weight (Table 5). *To improve appearance* and *to improve health and prevent future diseases* were the most frequently assessed motives for trying to *lose* weight (k =5), although *to improve wellbeing* was the most frequently reported motive (95%), followed by *to improve fitness condition or staying fit* (85%) and *to improve self-esteem* (74%). The most frequently reported motive for trying to *maintain* weight was *to improve health and prevent future diseases* (98%), followed by *to improve wellbeing* (91%), *to improve fitness condition or staying fit* (87%), *to improve appearance* (80%) and *to improve self-esteem* (71%). All other motives (e.g., *to please or by insistence of*

Table 4. Personal weight control strategies

	Weight loss attempts				Weight maintenance attempts			
Domains **Strategies**	**Number of studies**	***n***	**Prevalence (%)***	**References**	**Number of studies**	***n***	**Prevalence (%)***	**References**
Dietary choices								
Eat/drink low-calorie foods/beverages[1]	4	4285	39.2	(17, 32, 69, 106)	1	396	35.9	(17)
Drink water	3	4445	38.7	(17, 32, 61)	2	609	40.2	(17, 61)
Eat more/regularly fruits and vegetables[2]	3	374	85.3	(61, 75, 106)	2	213	86.9	(61, 75)
Eat breakfast	1	267	63.7	(61)	1	213	69.0	(61)
Eat soup	1	267	70.8	(61)	1	213	73.2	(61)
Energy compensation**								
Increased/regular PA/Exercise[2, 3, 4, 5]	27	122314	65.2	(17, 26, 32, 42, 43, 46-49, 57-59, 61, 63, 69, 70, 72, 73, 75, 76, 78, 79, 84, 90, 94, 97, 106)	7	36000	50.2	(17, 26, 42, 43, 61, 72, 75)
Information seeking								
Select foods consciously	3	692	82.2	(42, 43, 61)	3	679	83.7	(42, 43, 61)
Seek information on food / nutrition / PA[5]	2	267	57.7	(59, 61)	1	213	57.7	(61)
Regulation: Restrictions								
Skip meals[2, 4, 6]	9	15135	13.8	(17, 32, 42, 43, 49, 69, 75, 76, 106)	4	396	8.90	(17, 42, 43, 75)
Eat less fat / fatty foods[2]	6	13895	51.0	(17, 32, 43, 75, 76, 106)	3	615	57.9	(17, 43, 75)
Eat less sugar / sugary foods[2, 3]	4	298	66.1	(43, 47, 75, 106)	2	219	63.5	(43, 75)
Follow a special/fad diet	4	5876	11.9	(17, 32, 61, 69)	2	609	1.64	(17, 61)
Drink less alcoholic beverages	2	425	44.9	(42, 43)	2	466	42.5	(42, 43)
Eat less fried/junk foods[2]	1	-	-	(75)	1	-	-	(75)
Eat less high-carbohydrate foods	1	107	60.7	(106)	0			
Eat less meat	1	107	49.5	(106)	0			
Limit snacking	1	107	59.8	(106)	0			
Regulation: Rule-setting								
Eat more frequently (small meals)	2	1698	20.7	(61, 69)	1	213	69.0	(61)
Eat slowly	1	267	47.6	(61)	1	213	50.7	(61)
Choose small portions	1	267	67.6	(61)	1	213	67.6	(61)
Restraint								
Dieting[2, 3, 4, 5]	20	117337	68.9	(26, 46-49, 57-59, 63, 69, 70,	2	34925	65.9	(26, 72)

				72, 73, 76, 78, 79, 84, 90, 94, 97)				
Reduce amount of food eaten[2, 3]	7	4710	66.9	(17, 32, 42, 43, 47, 75, 106)	4	862	63.3	(17, 42, 43, 75)
Self-monitoring								
Count calories[3]	5	2123	20.4	(42, 43, 47, 61, 69)	3	679	6.92	(42, 43, 61)
Record dietary intake and PA	2	1698	12.4	(61, 69)	1	213	7.04	(61)
Self-weighing	1	1431	70.7	(69)	0			
Support: Professional								
Attend a weight control program or group[4]	9	16585	6.28	(17, 32, 42, 46, 49, 58, 61, 69, 76)	3	856	1.87	(17, 42, 61)
Receive advice from a healthcare professional[5]	3	934	13.2	(46, 59, 61)	1	213	16.4	(61)
Weight management aids								
Use weight loss pills or supplements[2, 4]	14	19008	10.2	(17, 32, 43, 46, 48, 49, 57-59, 61, 69, 75, 76, 106)	4	828	1.21	(17, 43, 61, 75)
Use laxatives or diuretics[2, 7]	10	13067	2.92	(17, 42, 43, 58, 59, 61, 69, 75, 76, 106)	5	679	6.19	(17, 42, 43, 61, 75)
Eat diet foods or products[1, 5]	7	5528	15.9	(17, 32, 42, 48, 58, 59, 69)	2	643	3.42	(17, 42)
Use meal replacements (food/drinks)	5	6189	9.73	(17, 32, 43, 58, 69)	2	615	1.30	(17, 43)
Vitamins	3	2547	25.2	(48, 58, 69)	0			
Traditional medicine[5]	2	389	10.0	(58, 59)	0			
Devices	1	1431	0.98	(69)	0			
Surgery	1	1431	0.56	(69)	0			
Extreme strategies								
Fasting or vomiting[2, 6, 7]	10	12856	4.74	(17, 42, 43, 57, 59, 61, 69, 75, 76, 106)	5	213	0.90	(17, 42, 43, 61, 75)
Smoking	3	532	6.95	(42, 43, 106)	2	466	5.15	(42, 43)

*Prevalence indicates the number of respondents out of *n* study sample that reported using strategies for trying to lose or maintain weight. [1]Study (69) was not accounted for sample size or prevalence rate in this strategy due to assessment differences (several low-calorie foods were assessed separately). [2]Studies (26, 75) were not accounted for sample size or prevalence rates since they didn't report separate values for trying to lose and maintain weight. [3]Studies (47, 63, 90, 97) were not accounted for sample size or prevalence rates due to assessment differences (only the key method was assessed). [4]Studies (49, 78, 84, 94) were not accounted for sample size or prevalence rates because they didn't have sufficient data available. [5]Study (59) was not accounted for sample size or prevalence rates in this strategy due to assessment differences (only the key method was assessed). [6]Studies (42, 43) were not accounted for sample size or prevalence rates in this strategy due to assessment differences (fasting was assessed together with skipping meals). [7]Study (17) was not accounted for sample size or prevalence rate in this strategy due to assessment differences (vomiting was assessed together with the use of laxatives).

**Exercise/physical activity was considered in the Energy Compensation domain since this strategy is commonly used to compensate energy intake as a way to control weight.

Table 5. Weight control motives

	Weight loss attempts				Weight maintenance attempts			
Motives	Number of studies	*n*	Prevalence (%)*	References	Number of studies	*n*	Prevalence (%)*	References
Improve appearance	5	1104	71.4	(42, 49, 57, 59, 61)	2	460	79.8	(42, 61)
Improve health/prevent diseases	5	1104	35.3	(42, 49, 57, 59, 61)	2	460	97.6	(42, 61)
Improve wellbeing	3	501	95.0	(19, 42, 61)	3	460	90.8	(19, 42, 61)
Improve fitness condition/stay fit	3	501	84.6	(42, 57, 61)	2	460	86.9	(42, 61)
Improve self-esteem	3	501	73.9	(42, 57, 61)	2	460	71.0	(42, 61)
Health professional advice	3	501	40.0	(19, 42, 61)	3	460	38.6	(19, 42, 61)
Please/insistence of spouse or partner	2	234	46.2	(19, 42)	2	247	32.0	(19, 42)
Improve social life/avoid discrimination	2	267	37.8	(19, 61)	2	213	44.6	(19, 61)
Improve professional life/fulfill specific professional requirements	2	267	32.2	(19, 61)	2	213	42.7	(19, 61)
Please/insistence of family	2	234	27.8	(19, 42)	2	247	24.9	(19, 42)
Decrease disease risk (e.g., heart attack)	1	-	-	(49)	0	-	-	
Special event/season (e.g., holiday, summer)	1	-	-	(19)	1	-	-	(19)

*Prevalence indicates the number of respondents out of *n* study sample that reported motives for trying to lose or maintain weight. Studies (19, 49, 59) were not accounted for sample size or prevalence rate because they didn't have sufficient data available. Data from study (69) was not included due to methodological differences (only the most important motive was reported).

spouse/partner, due to health professional advice) were listed by less than 50% of participants.

Discussion

This comprehensive systematic review and meta-analysis sought to estimate the prevalence of weight control attempts among adults worldwide, and identify potential correlates, personal strategies used and the underlying motivations. Seventy-two studies with more than a million participants were included, showing that weight is a matter of concern to a significant portion of the population. Results from high quality studies showed that about 42% of adults from general populations and 44% of adults from ethnic-minority populations reported trying to *lose* weight, and about 23% of adults from general populations reported trying to *maintain* weight at some point in time. Significant differences were found between decades and geographic regions: higher prevalence rates of weight loss attempts among adults from general populations occurred in the decade of 2000-2009 and in Europe and Central Asia. In the last five years (2010-2015), about 40% of adults from general populations reported trying to lose weight. As expected, higher prevalence of weight loss attempts among adults was observed in overweight and obese persons and in women. Across populations, 37 different personal strategies were reported for managing weight, standing out physical activity participation and dieting, which were classified, respectively, within the energy compensation and restraint domains of the OxFAB Taxonomy. Finally, 12 different motives for trying to manage weight were cited, the most common being increasing wellbeing and achieving long-term health.

To our knowledge, this is the first systematic review and meta-analysis presenting comprehensive estimates of the prevalence of weight *loss* and *maintenance* attempts and describing the related factors among adults across the globe. This is of considerable relevance since accurate information in this area should assist in the evaluation of changes and trends worldwide, in setting priorities for public health initiatives, and in planning management of weight control services.

Prevalence of weight control attempts

The overall summary of prevalence results in general populations mirror the overweight and obesity trends worldwide: prevalence rates have increased in the last

decades and are higher in Europe/Central Asia and in the US (20). The prevalence of weight loss attempts appears to have peaked in the beginning of the 2000s. Factors that explain the growing prevalence of weight loss attempts in the start of this millennium may include changes in social norms regarding obesity, an increase in the number of products and services targeting weight management or greater importance attributed by the population to weight or body shape and health. The significant differences observed between geographic regions may also be linked to the cultural context of each region, as well as to the physical environment and socioeconomic condition, as these factors may influence the development of health-promoting behaviors. For example, individuals from higher socioeconomic groups and with higher levels of education are more likely to try to control their weight (21, 22), perhaps because they are exposed to social advantages such as access to weight loss services, higher affordability of healthy choices, and knowledge, which collectively facilitate the adoption of energy-balance related behaviors (23, 24). Our findings also highlight the role of gender on weight-related aspects, with more women attempting to lose weight than men. One possible explanation for this is that social norms and cultural pressures to be thin especially affect women (25), or that women with normal weight often perceive themselves as being overweight (26) and consequently engage in more efforts to become or remain thin.

Although the prevalence of overweight and obesity is particularly high in some ethnic-minority groups (27), the overall summary prevalence of weight loss attempts in this population was only slightly different than that observed in general populations (+2.6%), apparently presenting its peak also in the beginning of the 2000s. One possible justification is a difference in attitudes and cultural norms regarding weight: for example, previous studies have shown that non-Hispanic black and Hispanic women are more satisfied with their body size than Caucasian women, and individuals who are satisfied with their body size are less likely to try to lose weight (28). However, it should be noted that the limited number of studies without methodological limitations ($k = 3$, $n = 3{,}217$) reduces the confidence in the results, compared with the analyses with general populations ($k = 34$, $n = 1{,}062{,}133$). Also, the limited number of studies with ethnic-minority populations limits the conclusions that can be drawn from the moderator analyses since we could not test whether the prevalence of weight loss attempts varied with the prevalence of overweight and obesity, and the non-significant effects found may be due to low statistical power (10).

Personal weight control strategies

The most consistently assessed strategies, which were used by the majority of individuals trying to lose and maintain weight, were related with increasing energy expenditure and reducing energy intake, in line with evidence-based guidelines for weight management (1). Other strategies related with improving the quality of the diet - by increasing the consumption of healthy foods (e.g., eating more fruits and vegetables) or restricting the consumption of unhealthy foods (e.g., eating less sugary foods) - were moderately assessed across studies, and also frequently reported, although they may or may not have an impact on body weight (e.g., (29)). Importantly, several weight management aids - weight loss pills or supplements, laxatives or diuretics, diet products, and meal replacements – and also more extreme strategies - fasting or vomiting - were reported by a low percentage of individuals, mostly for trying to lose weight. This is encouraging in suggesting that in the adult population worldwide, weight control appears to be more associated with health-promoting rather than potentially harmful strategies. With the exception of a few of these strategies (e.g., some weight loss pills (30)), there is no scientific evidence suggesting their effectiveness (e.g., (31-33)) and they may be associated with weight cycling and regain over time (34), and with eating disorders (35).

Weight control motives

Based on the present findings, the public health message on managing weight for long-term health, preventing disease, general wellbeing, or improving fitness seem to have been endorsed across populations. However, reasons such as enhancing appearance, conforming to external request/demands (spouse or doctor), and avoiding discrimination were also relatively common. Considering the positive role that more internal motives (e.g., health and wellbeing) appear to have on long-term weight control and related behaviors (36, 37), the large endorsement of relatively external motives (e.g. social pressure, even protecting one's self-esteem from prejudice) may be a cause for concern. Research has now clearly shown that having a more positive body image, not feeling pressured or discriminated against, and losing weight mostly for autonomous (i.e., more internal) reasons pays off in increased adherence to weight-healthy behaviors and higher success rates (38-40).

Strengths and limitations

The present review has a number of strengths but also some limitations. First, while it includes a large number of epidemiological studies, which make the findings robust, they are not all nationally representative and response rates varied considerably among studies, leading to inexact overall prevalence rates. Although nationally representative samples are preferable, not including the regional representative and the non-representative samples would limit our results in terms of time points and geographical regions for which nationally representative data is not available. We performed sensitivity analyses, repeating the analyses without the studies with methodological limitations, in an attempt to partially overcome this limitation. Second, although surveys have several advantages – they are the standard way of gathering prevalence data; are relatively cheap to administer; information is uniform across the years; and privacy can be maintained – they also have disadvantages. These include being subject to social desirability and selection bias towards more motivated individuals; they are also sensitive to the target groups' literacy level (41). Also, surveys were administered in different ways across studies - electronically, via mail, telephone or in person – which could impact final results. Third, although important potential moderators of weight control attempts were tested – percentage of women in the samples, percentage of overweight individuals in the samples, age, geographic region and decade of survey –, other variables with potential moderator effect were not assessed, such as socioeconomic status or education level. The main reason for not including these variables was the different methodologies to assess these constructs used across studies, which makes it difficult to standardize results. Fourth, a great variety of personal strategies for attempting to control weight were assessed in a relatively small number of studies, which makes it difficult to determine the exact prevalence of usage of each method. This makes results for weight loss strategies less robust that what is desirable, which should be seen as an important limitation. A systematic standardized approach in this regard must be taken in future studies (for example, using validated instruments like the OxFAB taxonomy (13), which we have used to synthesize results). Finally, weight control motives, which are particularly susceptible to social desirability/undesirability, were assessed in only a small number of studies and without a standardized instrument, probably leading to over-/underestimated results.

Conclusions and implications

In summary, this study indicates that in the general population about four in ten adults have tried to lose weight at some point in time and also in the last five years. Key strategies and motives associated with weight control were identified, presenting a clearer picture of weight management from the perspective of those actively seeking it. Although the majority of individuals used strategies in line with recommendations (social desirability notwithstanding), we could not estimate the psychological, economical, or social impacts that these attempts may involve. Losing weight often involves substantial investments of time, energy, and expectations, sometimes lasting years or decades, something which cannot be ignored. Finally, there seems to be a mismatch between prevalent motives to lose weight and those which research indicates as more conducive to long-term success.

We believe that this detailed picture of weight control attempts among adults worldwide provides valuable information for healthcare professionals and policy makers towards better planning and resource allocation directly targeting obesity prevention and treatment. From a societal perspective, and considering the high demand for weight management solutions, it is imperative to rigorously evaluate the quality of community, public, and especially commercial weight management services and products, which are increasingly available, and to respond to this demand by funding research for, and promoting evidence-based and safe services and products targeting long-term weight control. Additionally, in order to better capture prevalence shifts, surveillance systems should be scheduled, with internationally widespread screening instruments developed and validated for that purpose that will guarantee accuracy and comparability of results.

Acknowledgments

This study was funded by the Portuguese Science and Technology Foundation (grant number SFRH/BD/80739/2011 attributed to the first author). The second author is funded by Fuse, the UK Clinical Research Collaboration Centre of Excellence for Translational Research in Public Health; based on funding from the British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research, and the Wellcome Trust. The authors are grateful to Jolanda Luime for her collaboration involving the quality assessment of the studies.

References

1. Jensen MD, Ryan DH, Apovian CM, et al. 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. *Circulation* 2014; **129**: S102-S138.
2. Butland B, Webb S, Kopelman P, et al. *Tackling Obesities: Future Choices - Project report*, Government Office for Science 2007.
3. Centers for Disease Control and Prevention. *Best practices for comprehensive tobacco control programs - 2014.* Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Of ce on Smoking and Health, 2014.
4. Raynor HA, Champagne CM. Position of the Academy of Nutrition and Dietetics: Interventions for the Treatment of Overweight and Obesity in Adults. *J Acad Nutr Diet* 2016; **116**(1): 129-147.
5. Teixeira PJ, Going SB, Sardinha LB, Lohman TG. A review of psychosocial pre-treatment predictors of weight control. *Obes Rev* 2005; **6**(1): 43-65.
6. Carmody TP, Brunner RL, St Jeor ST. Dietary helplessness and disinhibition in weight cyclers and maintainers. *Int J Eat Disord* 1995; **18**(3): 247-256.
7. Friedman MA, Brownell KD. Psychological correlates of obesity: moving to the next research generation. *Psychol Bull* 1995; **117**(1): 3-20.
8. The Joanna Brigs Institute. *Joanna Briggs Institute Reviewers' Manual: 2014 edition/Suppplement*. The Joanna Brigs Institute, Adelaide: 2014.
9. Borenstein M, Hedges L, Higgins J, Rothstein H. *Comprehensive Meta-Analysis Version 2*. Engelwood, NJ: Biostat, 2005.
10. Borenstein M, Hedges L, Higgins J, Rothstein HR. *Introduction to Meta-analysis*. Chichester, United Kingdom: Wiley & Sons, Lda., 2009.
11. Cochran WG. The combination of estimates from different experiments: *Biometrics* 1954, **10**(1): 101-129.
12. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *British Med J* 2003; **327**(7414): 557-560.

13. Hartmann-Boyce J, Aveyard P, Koshiaris C, Jebb SA. Development of tools to study personal weight control strategies: OxFAB taxonomy. *Obes (Silver Spring)* 2016; **24**(2): 314-320.
14. Sterne JA, Egger M. Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. *J Clin Epidemiol* 2001; **54**(10): 1046-1055.
15. Peltzer K, Pengpid S. Trying to lose weight among non-overweight university students from 22 low, middle and emerging economy countries. *Asia Pac J Clin Nutr* 2015; **24**(1): 177-183.
16. Mardiah BA, Hazizi AS, Nasir MTM, Zaitun Y, Jan JMH. Gender Differences in the Attitude and Strategy towards Weight Control among Government Employees in Penang, Malaysia. *Iranian J Public Health* 2012; **41**(1): 28-36.
17. Weiss EC, Galuska DA, Khan LK, Serdula MK. Weight-control practices among U.S. adults, 2001-2002. *Am J Prev Med* 2006; **31**(1): 18-24.
18. Leong SL, Madden C, Gray AR, Horwath CC. A nationwide survey of weight control practices among middle-aged New Zealand women. New Zealand Med J 2013; **126**(1386): 12-20.
19. Santos O, Sermeus G, Carmo Id, Anelli M, Kupers P, Martin E. In search of weight loss - a four-country survey on what people were doing for losing weight at the turn of the century. *Endocrinol, Diabetes & Obes* 2010; **4**(1): 21-31.
20. World Health Organization. *Global status report on noncommunicable diseases*. World Health Organization, 2010.
21. Wardle J, Griffith J. Socioeconomic status and weight control practices in British adults. *J Epidemiol Community Health* 2001; **55**(3): 185-190.
22. French SA, Jeffery RW, Forster JL, McGovern PG, Kelder SH, Baxter JE. Predictors of weight change over two years among a population of working adults: the Healthy Worker Project. *Int J Obes Relat Metab Disord* 1994; **18**(3): 145-154.
23. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med* 2002; **22**(1): 23-29.
24. Blane D. *The life course, the social gradient and health*. In: Marmot M, Wilkinson RG, editors. Social determinants of health. Oxford, UK: Oxford University Press, 2001. p. 64-80.
25. Carraça EV, Silva MN, Teixeira PJ. *Body image investment and self-regulation of weight control behaviors*. In: Sams LB, Keels JA, editors. Handbook on body

image: Gender differences, sociocultural influences and health implications. New York: Nova Publishers, 2013.

26. Yaemsiri S, Slining MM, Agarwal SK. Perceived weight status, overweight diagnosis, and weight control among US adults: the NHANES 2003-2008 Study. *Int J Obes* 2011; **35**(8): 1063-1070.
27. Centers for Disease Control and Prevention. Differences in the prevalence of obesity among black, white, and Hispanic adults - United States, 2006-2008. Centers for Disease Control and Prevention, 2009.
28. Millstein RA, Carlson SA, Fulton JE, Galuska DA, Zhang J, Blanck HM, et al. Relationships between body satisfaction and weight control practices among US adults. *Medscape J Med* 2008; **10**(5): 119.
29. Field AE, Gillman MW, Rosner B, Rockett HR, Colditz GA. Association between fruit and vegetable intake and change in body mass index among a large sample of children and adolescents in the United States. *Int J Obes Relat Metab Disord* 2003; **27**(7): 821-826.
30. Drew BS, Dixon AF, Dixon JB. Obesity management: update on orlistat. *Vasc Health Risk Manag* 2007; **3**(6): 817-821.
31. Klesges RC, Ward KD, Ray JW, Cutter G, Jacobs DR, Jr., Wagenknecht LE. The prospective relationships between smoking and weight in a young, biracial cohort: the Coronary Artery Risk Development in Young Adults Study. *J Consult Clin Psychol* 1998; **66**(6): 987-993.
32. Nicklas JM, Huskey KW, Davis RB, Wee CC. Successful Weight Loss Among Obese U.S. Adults. *Am J Prev Med* 2012; **42**(5): 481-485.
33. Dombrowski SU, Knittle K, Avenell A, Araujo-Soares V, Sniehotta FF. Long term maintenance of weight loss with non-surgical interventions in obese adults: systematic review and meta-analyses of randomised controlled trials. *British Med J* 2014; **348**: g2646.
34. Neumark-Sztainer D, Wall M, Story M, Standish AR. Dieting and unhealthy weight control behaviors during adolescence: associations with 10-year changes in body mass index. *J Adolesc Health* 2012; **50**(1): 80-86.
35. Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA. Shared risk and protective factors for overweight and disordered eating in adolescents. *Am J Prev Med* 2007; **33**(5): 359-369.

36. Silva MN, Markland D, Carraca EV, Vieira PN, Coutinho SR, Minderico CS, et al. Exercise autonomous motivation predicts 3-yr weight loss in women. *Med Scie Sports Exerc* 2011; **43**(4): 728-737.
37. Gorin AA, Powers TA, Koestner R, Wing RR, Raynor HA. Autonomy support, self-regulation, and weight loss. *Health Psychol* 2014; **33**(4): 332-339.
38. Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obes (Silver Spring)* 2009; **17**(5): 941-964.
39. Teixeira PJ, Carraca EV, Marques MM, Rutter H, Oppert JM, De Bourdeaudhuij I, et al. Successful behavior change in obesity interventions in adults: a systematic review of self-regulation mediators. *BMC Med* 2015; **13**: 84.
40. Schvey NA, Puhl RM, Brownell KD. The impact of weight stigma on caloric consumption. *Obes (Silver Spring)* 2011; **19**(10): 1957-1962.
41. Hawe P, Degeling D, Hall J. *Evaluating health promotion: a health worker's guide*. Sydney: MacLennan & Petty, 1990.
42. Crawford D, Owen N, Broom D, Worcester M, Oliver G. Weight-control practices of adults in a rural community. *Aust N Z J Public Health* 1998; **22**(1): 73-79.
43. Timperio A, Cameron-Smith D, Burns C, Crawford D. The public's response to the obesity epidemic in Australia: weight concerns and weight control practices of men and women. *Public Health Nutr* 2000; **3**(4): 417-424.
44. Charles J, Britt H, Knox S. Patient perception of their weight, attempts to lose weight and their diabetes status. *Aust Fam Physician* 2006; **35**(11): 925-928.
45. Jeffery RW, Abbott G, Ball K, Crawford D. Behavior and weight correlates of weight-control efforts in Australian women living in disadvantage: The READI study. *Int J Behav Nutr Phys Act* 2013; **10**: 52.
46. Yoong SL, Carey ML, Sanson-Fisher RW, D'Este C. A cross-sectional study assessing the self-reported weight loss strategies used by adult Australian general practice patients. *BMC Fam Pract* 2012; **13**: 48.
47. Paxton SJ, Sculthorpe A, Gibbons K. Weight-loss strategies and beliefs in high and low socioeconomic areas of Melbourne. *Australian J Public Health* 1994; **18**(4): 412-417.
48. Machado EC, Silveira MF, Silveira VM. Prevalence of weight-loss strategies and use of substances for weight-loss among adults: a population study. *Cad Saude Publica* 2012; **28**(8): 1439-1449.

49. Green KL, Cameron R, Polivy J, Cooper K, Liu LY, Leiter L, et al. Weight dissatisfaction and weight loss attempts among Canadian adults. *Canad Med Assoc J* 1997; **157**(Suppl 1): S17-S25.
50. Gallant AR, Perusse-Lachance E, Provencher V, Begin C, Drapeau V. Characteristics of individuals who report present and past weight loss behaviours: results from a Canadian university community. *Eat Weight Disord* 2013; **18**(4): 395-401.
51. Johnston DW, Lordan G. Weight perceptions, weight control and income: an analysis using British data. *Econ Hum Biol* 2014; **12**: 132-139.
52. Korkeila M, Rissanen A, Kaprio J, Sorensen TI, Koskenvuo M. Weight-loss attempts and risk of major weight gain: a prospective study in Finnish adults. *Am J Clin Nutr* 1999; **70**(6): 965-975.
53. Monneuse MO, Bellisle F, Koppert G. Eating habits, food and health related attitudes and beliefs reported by French students. *Eur J Clin Nutr* 1997; **51**(1): 46-53.
54. Wardle J, Griffith J, Johnson F, Rapoport L. Intentional weight control and food choice habits in a national representative sample of adults in the UK. *Int J Obes Relat Metab Disord* 2000; **24**(5): 534-540.
55. Jackson SE, Wardle J, Johnson F, Finer N, Beeken RJ. The impact of a health professional recommendation on weight loss attempts in overweight and obese British adults: a cross-sectional analysis. *BMJ Open* 2013; **3**(11): e003693.
56. Wakui S, Odagiri Y, Takamiya T, Inoue S, Kato R, Ohya Y, et al. Relation between self-reported weight cycling history, dieting and bio-behavioral health in Japanese adult males. *Environm Health Prev Med* 2002; **6**(4): 248-255.
57. Tamim H, Dumit N, Terro A, Al-Hourany R, Sinno D, Seif F, et al. Weight control measures among university students in a developing country: a cultural association or a risk behavior. *J Am Coll Nutr* 2004; **23**(5): 391-396.
58. Kong W-T, Bhua S-S, Alwi S. Weight loss among Malaysian adults. *Asia-Pacific J Public Health* 2002; **14**(2): 99-104.
59. Mendez-Hernandez P, Dosamantes-Carrasco D, Lamure M, Lopez-Loyo P, Hernandez-Palafox C, Pineda-Perez D, et al. Weight-loss practices among university students in Mexico. *Int J Public Health* 2010; **55**(3): 221-225.

60. Hjartaker A, Laake P, Lund E. Body mass index and weight change attempts among adult women - The Norwegian Women and Cancer Study. *Eur J Public Health* 2001; **11**(2): 141-146.
61. Santos I, Andrade AM, Teixeira, PJ. [Weight control attempts among Portuguese adultos: Prevalence, motives and behavioral strategies]. *Acta Med Port* 2015; **28**(1): 77-86.
62. Pengpid S, Peltzer K. Prevalence of overweight and underweight and its associated factors among male and female university students in Thailand. *Homo* 2015; **66**(2): 176-186.
63. Stephenson MG, Levy AS, Sass NL, McGarvey WE. 1985 NHIS findings: nutrition knowledge and baseline data for the weight-loss objectives. *Public Health Rep* 1987; **102**(1): 61-67.
64. Serdula MK, Mokdad AH, Pamuk ER, Williamson DF, Byers T. Effects of question order on estimates of the prevalence of attempted weight-loss. *Am J Epidemiol* 1995; **142**(1): 64-67.
65. Jeffery RW, Adlis SA, Forster JL. Prevalence of dieting among working men and women: the healthy worker project. *Health Psychol* 1991; **10**(4): 274-281.
66. Kant AK. Weight-loss attempts and reporting of foods and nutrients, and biomarkers in a national cohort. *Int J Obes Relat Metab Disord* 2002; **26**(9): 1194-1204.
67. Williamson DF, Serdula MK, Anda RF, Levy A, Byers T. Weight loss attempts in adults: goals, duration, and rate of weight loss. *Am J Public Health* 1992; **82**(9): 1251-1257.
68. Horm J, Anderson K. Who in America is trying to lose weight? *Ann Intern Med* 1993; **119**(7 Pt 2): 672-676.
69. Levy AS, Heaton AW. Weight control practices of U.S. adults trying to lose weight. *Ann Intern Med* 1993; **119**(7 Pt 2): 661-666.
70. Barrett DH, Anda RF, Croft JB, Serdula MK, Lane MJ. The association between alcohol-use and health behaviors related to the risk of cardiovascular-disease - The South Carolina Cardiovascular-Disease Prevention Project. *J Studies Alcohol* 1995; **56**(1): 9-15.
71. Nothwehr F, Peterson NA. Healthy eating and exercise: Strategies for weight management in the rural midwest. *Health Educ Behav* 2005; **32**(2): 253-263.

72. Serdula MK, Mokdad AH, Williamson DF, Galuska DA, Mendlein JM, Heath GW. Prevalence of attempting weight loss and strategies for controlling weight. *JAMA* 1999; **282**(14): 1353-1358.
73. Kabeer NH, Simoes EJ, Murayi T, Brownson RC. Correlates of overweight and weight-loss practices in Missouri. *Am J Health Behav* 2001; **25**(2): 125-139.
74. Anderson LA, Eyler AA, Galuska DA, Brown DR, Brownson RC. Relationship of satisfaction with body size and trying to lose weight in a national survey of overweight and obese women aged 40 and older, United States. *Prev Med* 2002; **35**(4): 390-396.
75. Neumark-Sztainer D, Rock CL, Thornquist MD, Cheskin LJ, Neuhouser ML, Barnett MJ. Weight-control behaviors among adults and adolescents: associations with dietary intake. *Prev Med* 2000; **30**(5): 381-391.
76. Kruger J, Galuska DA, Serdula MK, Jones DA. Attempting to lose weight: specific practices among U.S. adults. *Am J Prev Med* 2004; **26**(5): 402-406.
77. Thomas RJ, Kottke TE, Brekke M, et al. Attempts at changing dietary and exercise habits to reduce risk of cardiovascular disease: who's doing what in the community? *Prev Cardiol* 2002; **5**(3): 102-108.
78. Bish CL, Blanck HM, Maynard LM, Serdula MK, Thompson NJ, Khan LK. Activity/participation limitation and weight loss among overweight and obese US adults: 1999 to 2002 NHANES. *MedGenMed* 2007; **9**(3): 63.
79. Bish CL, Blanck HM, Serdula MK, Marcus M, Kohl HW, Khan LK. Diet and physical activity behaviors among Americans trying to lose weight: 2000 Behavioral Risk Factor Surveillance System. *Obes Res* 2005; **13**(3): 596-607.
80. Wee CC, Rigotti NA, Davis RB, Phillips RS. Relationship between smoking and weight control efforts among adults in the united states. *Arch Intern Med* 2001; **161**(4): 546-550.
81. Kennen EM, Davis TC, Huang J, Yu H, Carden D, Bass R, et al. Tipping the scales: The effect of literacy on obese patients' knowledge and readiness to lose weight. *Southern Med J* 2005; **98**(1):15-18.
82. Wharton CM, Adams T, Hampl JS. Weight loss practices and body weight perceptions among US college students. *J Am Coll Health* 2008; **56**(5): 579-584.
83. Kimmons JE, Blanck HM, Tohill BC, Zhang J, Khan LK. Multivitamin use in relation to self-reported body mass index and weight loss attempts. *MedGenMed* 2006; **8**(3): 3.

84. Bish CL, Blanck HM, Maynard LM, Serdula MK, Thompson NJ, Khan LK. Health-related quality of life and weight loss practices among overweight and obese US adults, 2003 behavioral risk factor surveillance system. *MedGenMed* 2007; **9**(2): 35.

85. Duncan DT, Wolin KY, Scharoun-Lee M, Ding EL, Warner ET, Bennett GG. Does perception equal reality? Weight misperception in relation to weight-related attitudes and behaviors among overweight and obese US adults. *Int J Behav Nutr Phys Act* 2011; **8**: 20.

86. Zapka J, Lemon SC, Estabrook B, Rosal MC. Factors related to weight loss behavior in a multiracial/ethnic workforce. *Ethn Dis* 2009; **19**(2): 154-160.

87. Post RE, Mainous AG, III, Gregorie SH, Knoll ME, Diaz VA, Saxena SK. The Influence of Physician Acknowledgment of Patients' Weight Status on Patient Perceptions of Overweight and Obesity in the United States. *Arch Intern Med* 2011; **171**(4): 316-321.

88. Wolfson JA, Bleich SN. Is cooking at home associated with better diet quality or weight-loss intention? *Public Health Nutr* 2015; **18**(8): 1397-1406.

89. Moten A, Jeffers K, Larbi D, Smith-White R, Taylor T, Wilson L, et al. Obesity and Weight Loss Attempts among Subjects with a Personal History of Cancer. *Sultan Qaboos Univ Med J* 2014; **14**(3): e330-e336.

90. Lebrun LA, Chowdhury J, Sripipatana A, Nair S, Tomoyasu N, Ngo-Metzger Q. Overweight/obesity and weight-related treatment among patients in U.S. federally supported health centers. *Obes Res Clin Pract* 2013; **7**(5): e377-e390.

91. Rose SA, Gokun Y, Talbert J, Conigliaro J. Screening and management of obesity and perception of weight status in Medicaid recipients. *J Health Care Poor Underserved* 2013; **24**(2): 34-46.

92. Nguyen AB, Oh A, Moser RP, Patrick H. Perceptions of the roles of behaviour and genetics in disease risk: Are they associated with behaviour change attempts. *Psychol Health* 2015; **30**(3): 336-353.

93. Reba-Harrelson L, Von Holle A, Hamer RM, Swann R, Reyes ML, Bulik CM. Patterns and prevalence of disordered eating and weight control behaviors in women ages 25-45. *Eat Weight Disord* 2009; **14**(4): e190-e198.

94. Lee RE, Greiner A, Hall S, Born W, Kimminau KS, Allison A, et al. Ecologic correlates of obesity in rural obese adults. *J Am Coll Nutr* 2007; **26**(5): 424-433.

95. Nicolaou M, van Valkengoed IG, Doak CM, van Dam RM, Stronks K, Seidell JC. Ethnic differences in self-rated overweight and association with reporting weight loss action: the SUNSET study. *Eur J Public Health* 2012; **22**(6): 859-863.
96. Raberg M, Kumar B, Holmboe-Ottesen G, Wandel M. Overweight and weight dissatisfaction related to socio-economic position, integration and dietary indicators among south Asian immigrants in Oslo. *Public Health Nutr* 2010; **13**(5): 695-703.
97. Arfken CL, Houston CA. Obesity in inner-city African Americans. *Ethn Health* 1996; **1**(4): 317-326.
98. Riley NM, Bild DE, Cooper L, Schreiner P, Smith DE, Sorlie P, et al. Relation of self-image to body size and weight loss attempts in black women: the CARDIA study. Coronary Artery Risk Development in Young Adults. *Am J Epidemiol* 1998; **148**(11): 1062-1068.
99. Nelson DE, Moon RW, Holtzman D, Smith P, Siegel PZ. Patterns of health risk behaviors for chronic disease: A comparison between adolescent and adult American Indians living on or near reservations in Montana. *J Adolesc Health* 1997; **21**(1): 25-32.
100. Kumanyika S, Wilson JF, Guilforddavenport M. Weight-related attitudes and behaviors of black-women. *J Am Diet Assoc* 1993; **93**(4): 416-422.
101. Bopp M, Wilcox S, Laken M, Butler K, Carter RE, McClorin L, et al. Factors associated with physical activity among African-American men and women. *Am J Prev Med* 2006; **30**(4): 340-346.
102. Gary TL, Gross SM, Browne DC, LaVeist TA. The College Health and Wellness Study: baseline correlates of overweight among African Americans. *J Urban Health* 2006; **83**(2): 253-265.
103. Getaneh A, Giardina E-GV, Findley SE. Factors Related to Weight Loss Attempt Among Dominican Immigrants. *J Immigr Minor Health* 2013; **15**(3): 591-597.
104. James DC. Weight loss strategies used by African American women: possible implications for tailored messages. *J Hum Nutr Diet* 2013; **26**(1): 71-77.
105. Sherwood NE, Harnack L, Story M. Weight-loss practices, nutrition beliefs, and weight-loss program preferences of urban American Indian women. *J Am Diet Assoc* 2000; **100**(4): 442-446.
106. Harnack L, Bonnie MS, Rock H, Neumark-Sztainer D, Jeffery R, French S. Nutrition beliefs and weight loss practices of Lakota Indian adults. *J Nutr Educ* 1999; **31**(1): 10-15.

CHAPTER 3

Weight Control Attempts among Portuguese Adults: Prevalence, Motives and Behavioral Strategies (Study II)[3]

[3] **Santos I**, Andrade AM, Teixeira PJ. (2015). Weight control attempts among Portuguese adults: Prevalence, motives and behavioral strategies [Portuguese]. Acta Médica Portuguesa, 28(1):77-86. (IF: 0.360)

Abstract

Introduction: In Portugal, there are no representative data on how many people are actively trying to control their weight and which strategies and motives underlie those attempts. The aim of this study was to estimate the prevalence of weight loss/maintenance attempts and to identify the associated behavioral strategies and motives, in a representative sample of Portuguese adults.

Material and Methods: Cross-sectional study with a sample of 1098 Portuguese adults. Sociodemographic information, anthropometric data and weight loss/maintenance strategies and motives were assessed by telephone interview.

Results: About 44% of Portuguese adults (53% women and 35% men) are actively trying to control their weight. About 22% of women with normal weight are trying to lose weight while 53% of men and 34% of women with excess weight are not trying to manage their weight. About 49% of men with higher educational level are trying to control their weight, which compares to 32% among the least educated men. The most frequently used strategy to manage weight is regular vegetable consumption and the motives most frequently reported were improving health/preventing diseases and improving wellbeing.

Discussion and Conclusion: More than half of Portuguese women and about one-third of men are actively trying to control their weight, using behavioral strategies which are generally consistent with public health recommendations. The predominant motives are related to improving health and wellbeing. This study contributes to understanding weight management in Portugal, and could be useful in the development of obesity prevention strategies that match the population profile.

Keywords: Behavior; Obesity; Overweight; Portugal; Weight Loss.

Resumo

Introdução: Em Portugal não existem dados atuais sobre tentativas de controlo do peso nem sobre estratégias e motivos na base dessas tentativas na população. Este estudo teve como objectivos determinar a prevalência das tentativas de perda/manutenção do peso e identificar as estratégias comportamentais e os motivos associados, numa amostra representativa da população adulta portuguesa.

Material e Métodos: Estudo transversal constituído por 1098 indivíduos adultos. A informação sociodemográfica, os dados antropométricos e as estratégias e motivos associados à perda/manutenção do peso foram recolhidos por entrevista telefónica.

Resultados: Cerca de 44% dos adultos portugueses (53% de mulheres e 35% dos homens) estão ativamente a tentar controlar o peso. Salienta-se que 22% das mulheres com peso normal tentam perder peso e que 53% dos homens e 34% das mulheres com peso excessivo não o fazem. Entre os homens, 49% com nível educacional superior estão a tentar controlar o peso versus 32% com nível educacional básico. A estratégia mais frequentemente adoptada para gerir o peso é o consumo regular de hortícolas e os motivos mais referenciados são melhorar a saúde/prevenir doenças e melhorar o bem-estar.

Discussão e Conclusão: Mais de metade das mulheres e cerca de um terço dos homens em Portugal estão ativamente a tentar gerir o seu peso, utilizando estratégias comportamentais consistentes com as recomendações de saúde pública. Os motivos de saúde e bem-estar predominam sobre os restantes. Este estudo contribui para o conhecimento da gestão do peso em Portugal, alertando para o desenvolvimento de estratégias de prevenção da obesidade adequadas ao perfil da população.

Palavras-chave: Comportamento; Excesso de Peso; Obesidade; Perda de Peso; Portugal.

Introdução

A obesidade apresenta-se como um dos mais importantes desafios de saúde pública nas sociedades afluentes e a sua prevalência tem vindo a aumentar globalmente nas últimas décadas[1]. Os últimos dados de prevalência publicados em Portugal indicam que cerca de 67% dos homens e 58% das mulheres adultas portuguesas têm excesso de peso ou obesidade [Índice de Massa Corporal (IMC) $\geq$ 25 kg/m^2][2]. Na etiologia desta patologia estão, não só a predisposição genética mas também mudanças sociais, económicas, culturais e físicas do meio ambiente[1]. Está bem descrito na literatura que a obesidade aumenta o risco de diversas doenças crónicas e as *guidelines* internacionais para a gestão do peso em adultos indicam que alterações do estilo de vida que conduzam à manutenção de 3-5% do peso perdido acarretam melhorias substanciais nos factores de risco para estas doenças[3]. No entanto, a maioria das intervenções de perda de peso têm revelado resultados apenas a curto prazo, sendo o peso perdido geralmente recuperado no espaço de três a cinco anos. De facto, a manutenção do peso perdido a longo prazo continua a ser um desafio para muitas pessoas. Por todas estas razões, tentar controlar o peso é hoje parte integrante do estilo de vida de muitos indivíduos[4, 5].

Existem várias orientações no que respeita a estratégias e comportamentos, no contexto da alimentação e da atividade física, que resultam na gestão do peso a longo prazo. Por exemplo, o *National Institute for Health and Care Excellence* (NICE)[6] recomenda a ingestão de alimentos ricos em fibra, o consumo de pelo menos 5 porções de uma variedade de frutos e vegetais, a redução da ingestão energética e do consumo de gorduras, evitar o consumo de bebidas alcoólicas e bebidas açucaradas, tomar o pequeno-almoço diariamente, minimizar o tempo sedentário e praticar atividade física diariamente (entre outras). Atualmente, as estratégias mais utilizadas para gerir o peso, documentadas na literatura, são a redução da ingestão energética e o aumento da atividade física, de forma individualizada[7-10]. Contudo, para além destas estratégias promotoras de saúde, os estudos revelam que por vezes são também utilizadas outras práticas de controlo do peso potencialmente prejudiciais para a saúde (por exemplo, uso de laxantes, diuréticos, suplementos, fazer jejum prolongado)[11, 12]. Na base das tentativas de controlo do peso estão mais frequentemente motivos relacionados com a saúde, sendo a aparência e o bem-estar físico e psicológico outras das razões mais comuns[13, 14].

Em Portugal, esta área de estudo tem sido descurada e não existem, na literatura científica, dados atuais representativos que permitam tirar conclusões sobre o número de indivíduos que está ativamente a tentar controlar o peso, isto é, perder e/ou manter o peso, que estratégias utilizam especificamente para esse efeito, e que motivos estão na base dessas tentativas. Assim, e dado o crescente ênfase na prevenção do aumento de peso[3], uma melhor compreensão do comportamento dos portugueses relativamente ao controlo do peso, incluindo as estratégias e motivos, será útil para direcionar as políticas de saúde pública e para a promoção de práticas de gestão do peso mais efetivas na população adulta portuguesa. O presente estudo tem como objetivos determinar a prevalência das tentativas de perda e manutenção do peso numa amostra representativa da população adulta portuguesa, e identificar as estratégias comportamentais utilizadas, no âmbito da alimentação e da atividade física, assim como os motivos associados ao controlo do peso.

Material e Métodos

A seleção dos participantes foi feita com base numa amostragem probabilística de números telefónicos, na qual foram incluídos indicativos de rede fixa e de rede móvel. Os números telefónicos de rede fixa foram gerados aleatoriamente com estratificação por Região de Saúde, proporcionalmente à população correspondente aos limites geográficos à data. Segundo os resultados do Inquérito às Despesas das Famílias 2010/2011[15], 67,7% dos agregados familiares possuíam telefone fixo e 87,7% possuíam telemóvel. Desta forma, prevê-se que existam cerca de 1,2 vezes mais números de telemóvel comparativamente com números de rede fixa. Assim, estipulou-se que 83% das chamadas telefónicas seriam para rede móvel, a distribuir pelos três operadores dominantes de rede móvel nacionais (*TMN*, *Optimus* e *Vodafone*), e 17% seriam para rede fixa, a distribuir pelos 51 prefixos nacionais. A seleção da amostra e recolha de dados foi realizada por investigadores da Unidade de Epidemiologia do Instituto de Medicina Preventiva da Faculdade de Medicina da Universidade de Lisboa, durante o mês de Setembro de 2012, através de entrevistas telefónicas. As entrevistas telefónicas foram realizadas em horário laboral nos 5 dias da semana e todos os investigadores receberam formação específica para a recolha de dados.

Os agregados familiares foram selecionados por construção aleatória do número telefónico a partir da aleatorização dos seus dígitos. Visto que com este método há a possibilidade de selecionar números listados e não listados, os potenciais participantes

foram contactados a partir das listagens telefónicas previamente elaboradas e foram feitos contactos até se atingir o número de participantes necessário para se assumir a representatividade da população portuguesa (Portugal continental e ilhas) por sexo e grupo etário (18-40 anos; 41-65 anos) – cálculo amostral de 1068 indivíduos.

Dos 1847 indivíduos contactados com sucesso, 363 recusaram participar e 386 foram excluídos por não preencherem os critérios de elegibilidade - residiam em alojamentos colectivos, residiam em Portugal há menos de um ano à data da entrevista ou não tinham nacionalidade portuguesa, não conseguiram responder com acuidade às questões ou eram gestantes e lactantes. Assim, a amostra ficou constituída por 1098 indivíduos elegíveis, isto é, com nacionalidade portuguesa, residência particular e idade compreendida entre os 18 e os 65 anos. Todos os participantes deram consentimento verbal livre, específico e informado antes de participarem no estudo, de acordo com o protocolo aprovado.

Este estudo foi aprovado pela Comissão de Ética para a Saúde do Hospital de Santa Maria. Foi tida em conta a legislação nacional respeitante à proteção e confidencialidade dos dados pessoais (*processo nº 10026/2012 da Comissão Nacional de Proteção de Dados*), pelo que não foi constituída nenhuma base de dados nominal dos participantes.

Para a realização deste estudo, desenvolveu-se um questionário específico com base em instrumentos psicométricos recomendados na literatura, que incluiu 11 questões sociodemográficas, englobando idade, região de residência, estado civil, nível educacional e nível socioeconómico (calculado através do índice de Graffar[16]), 12 questões relativas às tentativas de perda e manutenção do peso, incluindo estratégias e motivos associados, e ainda 8 questões relativas à história do peso, incluindo peso e altura à data da entrevista, entre outras (documento suplementar). Com base no peso e na altura auto-reportados, calculámos o IMC (kg/m^2), o qual foi categorizado, de acordo com o preconizado pela Organização Mundial de Saúde[17], em: peso normal (IMC < 25 kg/m^2), pré-obesidade (IMC ≥ 25 e < 30 kg/m^2) e obesidade (IMC ≥ 30 kg/m^2).

Tentativas de controlo do peso

De forma a avaliar as tentativas de controlo do peso, os participantes indicaram o que tinham tentado fazer nos últimos 12 meses relativamente ao seu peso, com base em 7 categorias de resposta: 1) perder algum peso; 2) manter o seu peso, para não aumentar; 3) manter o seu peso, para não perder; 4) aumentar de peso; 5) nada, não se preocupou de todo com o seu peso; 6) nada, mas há mais de 12 meses, e já depois de completar 18 anos,

procurou perder ou manter o peso; 7) não sabe/não responde. Para o propósito deste estudo, as categorias 3) e 4) e as categorias 5) e 6) foram agrupadas.

Estratégias comportamentais

Aos participantes que referiram estar a tentar perder algum peso ou manter o peso para não aumentar foi-lhes pedido que indicassem, numa escala dicotómica (sim ou não), as estratégias (de uma lista de 18) que estavam a utilizar ou tinham utilizado no passado para tentar gerir o peso (por exemplo, "para controlar o seu peso pratica atividade física de forma regular, isto é, pelo menos 3 vezes por semana").

Motivos

Relativamente aos motivos para tentar perder ou manter o peso, os participantes responderam numa escala de *Likert* de 4 pontos (de "discordo fortemente" a "concordo fortemente") a uma lista de 8 razões que os levaram a tentar controlar o peso (por exemplo, "para melhorar a saúde em geral ou prevenir doenças futuras").

Análise estatística

Para a análise estatística dos dados utilizámos o programa IBM *Statistical Package for the Social Sciences* ® (SPSS), versão 22. Os resultados estão apresentados em percentagem. Utilizou-se o teste qui-quadrado para comparação entre grupos. Os dados estão expressos com intervalos de confiança de 95% (nível de significância de $\alpha = 0,05$).

Resultados

No total, 24,3% (n = 267) dos adultos portugueses reportaram estar a tentar perder peso, 19,4% (n = 213) a tentar manter o peso (isto é, evitar aumentar de peso) e 6,5% (n=71) a tentar aumentar de peso ou manter o peso para não perder (isto é, evitar perder peso), sendo que 49,8% (n = 547) reportaram não estar a fazer nada relativamente ao seu peso.

Considerando as tentativas de controlo do peso por sexo (Fig. 1), constata-se que mais de metade das mulheres adultas portuguesas estão a tentar controlar o peso (perder peso ou evitar aumentar), ao passo que nos homens esta prevalência foi de cerca de um terço.

Mais de metade dos adultos portugueses que reportaram ter pré-obesidade ou obesidade afirmaram estar a tentar controlar o peso (Fig. 2). Ainda assim, cerca de 44% indicaram não ter qualquer intenção de controlar o peso. No que respeita aos indivíduos que reportaram ter um peso dentro dos parâmetros da normalidade, apesar de a maioria reportar não estar a tentar controlar o peso, cerca de 39% afirmaram ter essa intenção.

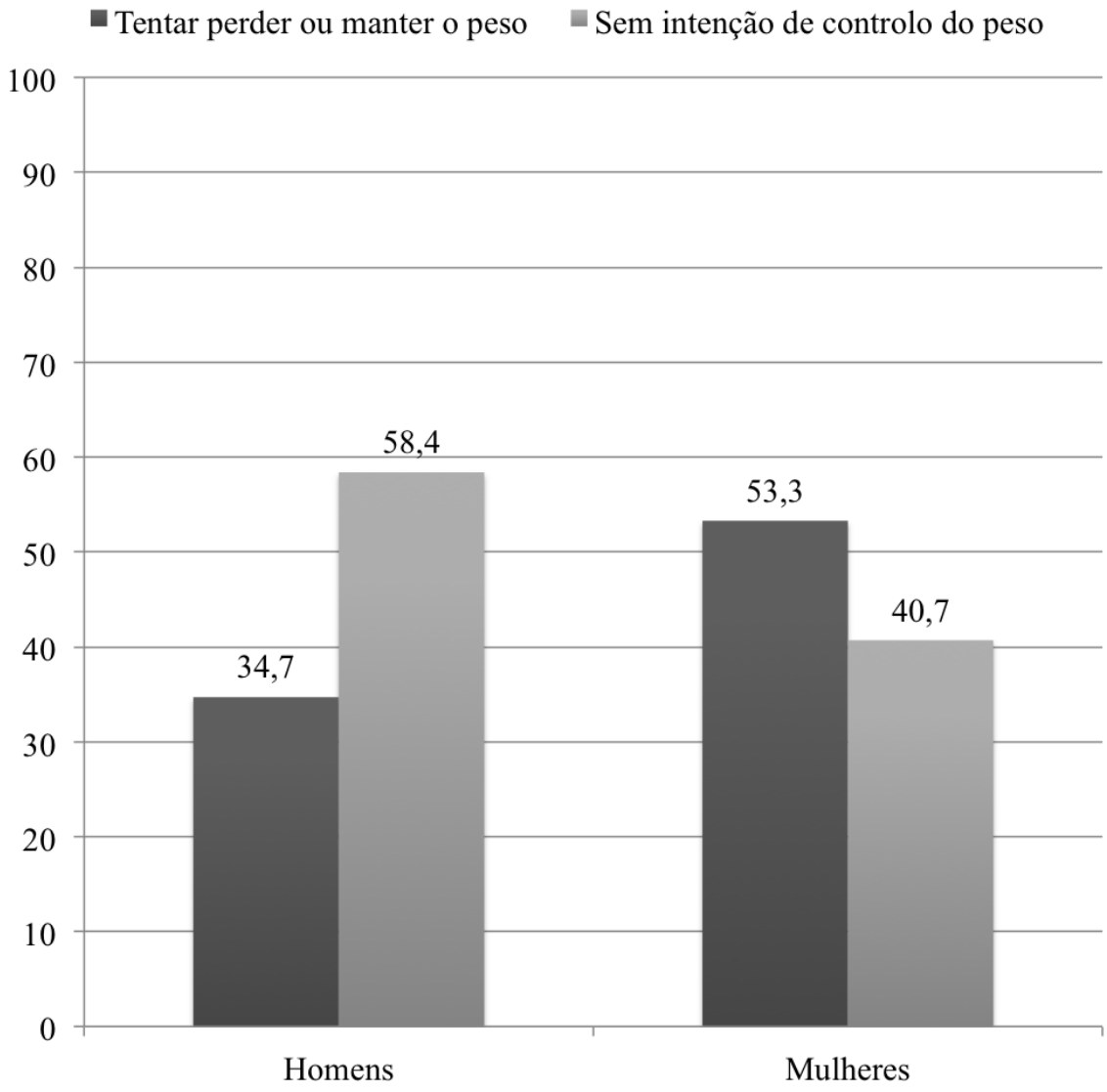


Figura 1. Prevalência das tentativas de controlo do peso, por sexo, na população adulta portuguesa. Valores expressos em percentagem.

A tabela 1 apresenta a prevalência das tentativas de controlo do peso de acordo com as características sociodemográficas. Não se observaram diferenças significativas entre os grupos de controlo do peso no que respeita à idade, estado civil e nível

socioeconómico (p > 0,05). Nas mulheres, mas não nos homens, observaram-se diferenças significativas relativamente à região de residência: uma maior proporção de mulheres residentes na zona de Lisboa e Vale do Tejo e na Madeira estavam a tentar perder peso, ao

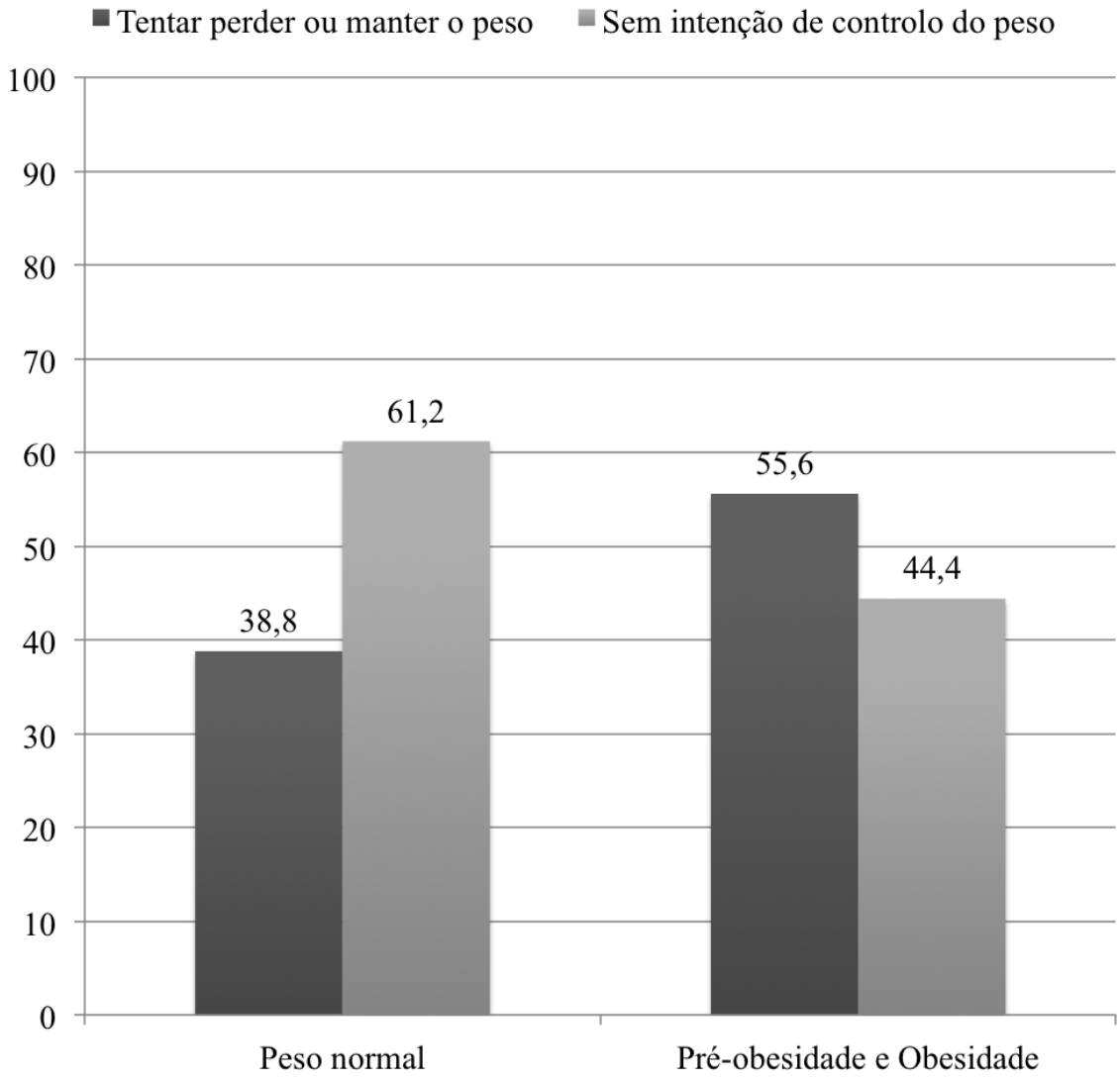


Figura 2. Prevalência das tentativas de controlo do peso, por categoria ponderal, na população adulta portuguesa. Valores expressos em percentagem.

passo que na região do Alentejo mais mulheres estavam a tentar manter o peso; nas restantes regiões houve mais mulheres a reportarem não estar a tentar controlar o peso (p < 0,001). Nos homens observaram-se diferenças significativas no que diz respeito ao nível educacional: apesar da maioria reportar não estar a tentar controlar o peso, mais homens com ensino básico e secundário reportaram estar a tentar perder peso e mais homens com ensino superior reportaram estar a tentar manter o peso (p = 0,009). Como esperado, uma

maior proporção de mulheres com pré-obesidade e obesidade reportaram estar a tentar perder peso, ao passo que mais mulheres com peso normal reportaram estar a tentar manter o peso ou a não fazer nada relativamente ao seu peso ($p < 0,001$). Em contraste, a mesma proporção de homens com obesidade reportou estar a tentar perder peso e não ter qualquer intenção de controlo do peso, e mais homens com peso normal e com pré-obesidade reportaram não estar a tentar controlar o peso ($p < 0,001$).

A estratégia comportamental mais frequentemente adoptada pela população adulta portuguesa, tanto com vista à perda de peso como à manutenção do peso, foi o consumo regular de produtos hortícolas nas refeições principais (Tabela 2). O consumo regular de sopa nas refeições principais, a ingestão de água em detrimento de outras bebidas, o consumo regular de pequeno-almoço, a inclusão de pequenas merendas a meio da manhã e da tarde, optar por consumir pequenas porções, praticar atividade física regularmente, procurar informar-se sobre nutrição e atividade física e selecionar de forma consciente os alimentos foram outras das estratégias utilizadas por mais de metade da população portuguesa (com vista a gerir o peso). Algumas estratégias foram significativamente mais prevalentes nas mulheres a tentar perder peso, comparativamente com as mulheres a tentar manter o peso, nomeadamente a ingestão regular de pequeno-almoço ($p = 0,042$), receber orientação de um especialista ($p = 0,001$), tomar medicamentos ou suplementos ($p < 0,001$), frequentar um programa de controlo do peso ($p = 0,001$), tomar laxantes ou diuréticos ($p = 0,001$) e induzir o vómito ou fazer jejum prolongado ($p = 0,016$).

Comparando as estratégias utilizadas para controlar o peso por sexo, apenas em seis das estratégias não se observaram diferenças significativas; uma maior proporção de homens referiu praticar atividade física de forma regular ($p = 0,004$) e uma maior proporção de mulheres referiu beber água em detrimento de outras bebidas ($p < 0,001$), consumir pequenas porções ($p < 0,001$), incluir pequenas merendas a meio da manhã e da tarde ($p = 0,001$), selecionar de forma consciente os alimentos ($p < 0,001$), tomar o pequeno-almoço regularmente ($p = 0,011$), receber orientação de um especialista ($p = 0,002$), contabilizar as calorias das refeições ($p = 0,019$), tomar medicamentos ou suplementos ($p < 0,001$), tomar laxantes ou diuréticos ($p = 0,001$), frequentar um programa de controlo do peso ($p = 0,009$) e fazer dietas "da moda" ($p = 0,016$).

Os motivos mais frequentemente reportados pela população adulta portuguesa para controlar o peso foram melhorar a saúde em geral ou prevenir doenças futuras e melhorar o bem estar no dia-a-dia (> 90%) (Tabela 3). Uma maior proporção de homens referiu tentar controlar o peso para melhorar a condição física ou conseguir praticar desporto mais

Tabela 1. Prevalência das tentativas de controlo do peso de acordo com as características sociodemográficas

Características	Homens (n=565)				Mulheres (n=533)			
	Tentar perder peso	Tentar manter o peso	Sem intenção de controlo do peso	p*	Tentar perder peso	Tentar manter o peso	Sem intenção de controlo do peso	p*
Idade				0,179				0,206
18-40 anos	22,3	17,1	60,6		29,3	25,5	45,2	
41-65 anos	16,0	19,1	65,0		36,6	21,8	41,6	
Região de residência				0,958				**<0,001**
Norte	20,8	20,3	58,9		25,8	26,3	47,8	
Centro	17,9	15,2	67,0		26,0	27,6	46,3	
Lisboa e Vale do Tejo	18,6	16,0	65,4		49,2	13,3	37,5	
Alentejo	12,5	25,0	62,5		30,8	46,2	23,1	
Algarve	23,5	17,6	58,8		39,3	14,3	46,4	
Madeira	25,0	12,5	62,5		71,4	14,3	14,3	
Açores	18,8	25,0	56,3		21,4	35,7	42,9	
Estado civil				0,144				0,190
Solteiro	25,4	15,4	59,2		27,3	30,2	42,4	
Casado/União de facto	15,9	19,9	64,2		35,7	20,4	43,9	
Divorciado/Viúvo	18,9	17,0	64,2		35,4	21,5	43,1	
Nível educacional				**0,009**				0,097
Ensino básico	16,7	15,3	68,1		32,6	18,6	48,8	
Ensino secundário	20,5	14,1	65,4		36,2	24,1	39,7	
Ensino superior	22,2	26,4	51,4		31,3	29,9	38,9	
Nível Socioeconómico				0,145				0,249
Elevado	20,4	23,4	56,2		36,3	26,9	36,8	
Médio	17,6	14,5	67,9		29,8	22,7	47,5	
Baixo	22,2	13,9	63,9		39,3	14,3	46,4	
Índice de Massa Corporal				**<0,001**				**<0,001**
Peso normal	9,8	17,3	72,8		22,1	27,0	50,9	
Pré-obesidade	23,5	21,7	54,8		44,4	20,5	35,1	
Obesidade	46,3	7,4	46,3		56,3	14,1	29,7	

Nota: Valores expressos em percentagem.*Teste qui-quadrado para comparação entre grupos (diferenças estatisticamente significativas assinaladas a negrito).

Tabela 2. Estratégias comportamentais utilizadas para controlar o peso, por sexo e intenção de controlo do peso

Estratégias	Homens (n=196)			Mulheres (n=284)		
	Tentar perder peso	Tentar manter o peso	Total	Tentar perder peso	Tentar manter[TT] o peso	Total[T]
Consumir regularmente hortícolas nas refeições principais	42,6	41,0	83,6	51,1	37,2	88,3 [1]
Consumir regularmente sopa nas refeições principais	36,4	33,8	70,3	41,7	31,8	73,5 [5]
Beber água em detrimento de outras bebidas	34,9	31,3	66,2	47,3	36,7	84,1 [2]***
Tomar o pequeno-almoço regularmente	31,1	29,0	60,1	39,0	32,3*	71,3 [7]*
Consumir pequenas merendas a meio da manhã/tarde	32,1	27,6	59,7	41,7	32,9	74,6 [4]**
Comer pequenas porções	33,2	26,4	59,6	43,2	32,5	75,7 [3]***
Praticar atividade física de forma regular	28,9	26,8	55,7	23,4	18,8	42,2 [10]**
Procurar informar-se sobre nutrição/atividade física	29,0	25,9	54,9	34,8	25,9	60,6 [8]
Selecionar de forma consciente os alimentos	27,7	26,7	54,4	40,4	31,9	72,3 [6]***
Comer pausadamente e mastigar bem os alimentos	23,2	23,7	46,9	29,1	22,0	51,1 [9]
Receber orientação de um especialista	10,2	6,6	16,8	21,3	7,8**	29,1 [11]**
Contabilizar as calorias das refeições	6,1	3,1	9,2	11,3	5,3	16,7 [12]*
Fazer registos alimentares/atividade física	3,1	4,1	7,1	6,4	2,5	8,8 [16]
Tomar medicamentos/suplementos	3,6	1,0	4,6	15,6	1,1***	16,7 [13]***
Frequentar um programa de controlo do peso	2,6	1,5	4,1	9,2	1,4**	10,6 [15]**
Tomar laxantes/diuréticos	2,6	1,0	3,6	10,3	1,8**	12,1 [14]**
Induzir o vómito/jejum prolongado	2,6	0,5	3,1	3,9	0,4*	4,3 [18]
Fazer dietas "da moda"	0,5	1,0	1,5	4,6	1,4	6,0 [17]*

Nota: Valores expressos em percentagem. Os números sobrescritos correspondem à ordem descendente.

*p <0,05; **p <0,01; ***p <0,001 (Teste qui-quadrado para comparação entre grupos).

[T]Diferenças entre sexos

[TT]Diferenças entre tentar perder peso e tentar manter o peso

Tabela 3. Motivos para controlar o peso, por sexo e intenção de controlo do peso

Motivos	Homens (n=196)			Mulheres (n=284)		
	Tentar perder peso	Tentar manter o peso [TT]	Total	Tentar perder peso	Tentar manter o peso [TT]	Total[T]
Melhorar saúde em geral/prevenir doenças futuras	49,0	47,4	96,4	54,3	40,4	94,7 [1]
Melhorar o bem-estar no dia-a-dia	49,0	47,4	96,4	53,9	40,8*	94,7 [2]
Melhorar a condição física/conseguir praticar desporto	43,8	41,2	85,1	40,6	32,4	73,0 [5]**
Manter/obter uma aparência física confortável	43,1	41,0	84,1	53,5	40,1	93,6 [3]**
Melhorar a autoestima em relação ao corpo	41,3	39,3	80,6	52,8	40,1*	92,9 [4]***
Resolver problema de saúde/indicação de um profissional	32,5	29,9	62,4	37,3	28,7	65,9 [6]
Cumprir requisitos específicos da profissão	17,3	25,5**	42,9	18,8	14,8	33,6 [8]*
Evitar ser descriminado/integrar-se melhor na sociedade	14,3	19,9*	34,2	26,2	20,1	46,2 [7]**

Nota: Valores expressos em percentagem. Os valores correspondem às respostas "concordo" e "concordo totalmente" para cada motivo. Os números sobrescritos correspondem à ordem descendente.

*p <0,05; **p <0,01; ***p <0,001 (Teste qui-quadrado para comparação entre grupos).

[T]Diferenças entre sexos

[TT]Diferenças entre tentar perder peso e tentar manter o peso

facilmente (p = 0,002) e para cumprir requisitos específicos da sua profissão ou ocupação (p = 0,040), comparativamente com as mulheres. Pelo contrário, uma maior proporção de mulheres referiu tentar controlar o peso por motivos relacionados com manter ou obter uma aparência física confortável (p = 0,001), melhorar a autoestima em relação ao seu corpo (p < 0,001) e evitar ser discriminada ou para se sentir mais bem integrada na sociedade (p = 0,009) em comparação com os homens. Observaram-se ainda diferenças significativas nos motivos para tentar perder *versus* manter o peso em ambos os sexos: uma maior proporção de homens a tentar manter o peso referiu fazê-lo para cumprir requisitos específicos da sua profissão ou ocupação (p = 0,007) e para evitar ser descriminado ou para se sentir mais bem integrado na sociedade (p = 0,049), comparativamente com os homens a tentar perder peso; e uma maior proporção de mulheres a tentar perder peso referiu fazê-lo para melhorar o bem estar no dia-a-dia (p = 0,023) e para melhorar a autoestima em relação ao corpo (p = 0,043), comparativamente com as mulheres na fase de manutenção.

Discussão

O presente estudo revelou que cerca de 44% dos adultos portugueses estão ativamente a tentar controlar o peso, mais especificamente cerca de 24% estão a tentar perder peso e cerca de 19% estão a tentar manter o peso, sendo a prevalência de ambos os indicadores superior nas mulheres. Da revisão efectuada, apenas um estudo com uma amostra representativa da população adulta portuguesa retratou esta temática, tendo concluído que cerca de 16% dos adultos portugueses estavam a tentar controlar o peso em 2001[18]. Este aumento nas tentativas de controlo do peso reflete as tendências relativas à prevalência de obesidade na população adulta portuguesa[2], facto que também parece verificar-se noutras populações. Por exemplo, nos EUA, dados do *Behavioral Risk Factor Surveillance System* revelaram que a proporção de indivíduos adultos a tentar perder peso era de 32,3% em 1989 e de 37,3% em 1999[19, 20] e dados do *National Health and Nutrition Examination Survey* mostraram que a prevalência de tentativas de perda de peso era de 32,9% no período de 1988-1994 e de 48% entre 2003-2008[8, 21]. Para além do aumento da obesidade *per se*, outros fatores podem também ajudar a perceber a tendência de crescimento nas tentativas de gerir o peso, como alterações na norma social face à obesidade e os seus riscos, um aumento do número de programas e produtos visando a

gestão de peso (comerciais, nos serviços de saúde, etc.), ou uma maior importância atribuída pela população ao peso ou forma do corpo, à saúde em geral, ou à relação entre os dois.

Considerando as tentativas de controlo do peso por categoria de IMC, é de salientar a proporção de mulheres com peso normal a tentar perder peso (22,1%). Yaemsiri e colaboradores[8] observaram que cerca de 29% das mulheres americanas adultas com peso saudável percepcionavam-se como tendo peso excessivo, sendo esta auto-percepção um forte preditor das tentativas de perda de peso. Em Portugal, Santos e colaboradores[18] constataram que cerca de 52% das mulheres adultas com peso normal sentiam ter peso excessivo. Este aspeto não foi avaliado no presente estudo, sendo por isso necessário mais dados para determinar em que medida as tentativas de controlo do peso nas mulheres portuguesas com peso normal são resultado de uma percepção distorcida do que é um peso saudável ou o reflexo de uma imagem corporal empobrecida que as leva a tentar alcançar o ideal de magreza valorizado socialmente (ou uma combinação de ambos os fatores).

Pese embora sejam bem reconhecidos os benefícios para a saúde da perda de peso estável e duradoura[3], é notável que mais de metade dos homens (53,1%) e 33.5% das mulheres portuguesas com peso excessivo (nota: 46,3% dos homens e 29,7% das mulheres com obesidade; dados não reportados) não estejam a tentar controlar o peso. Por um lado, a evidência científica revela que o sucesso da gestão do peso a longo prazo é modesto e que a experiência de repetidas tentativas de controlo do peso mal sucedidas podem conduzir ao desenvolvimento de processos cognitivos de descrença aprendida (por internalização do insucesso) e, consequentemente, a atitudes de cepticismo e passividade[4, 22, 23]. Por outro lado, podem também ocorrer muitos casos em que não existe suficiente consciência do que é um peso saudável (face ao próprio peso) e das vantagens em tentar obtê-lo. Estes são os casos para os quais se salienta o papel dos clínicos e das autoridades de saúde ao promover a perda e a manutenção do peso a longo prazo na população. Finalmente, são também possíveis casos em que as pessoas tomaram uma decisão consciente e informada no sentido de não procurarem a perda de peso, possivelmente por valorizarem mais outros aspetos da sua vida e da gestão da sua saúde. Estudos futuros deverão ajudar a identificar e distinguir as razões para a não procura da perda de peso em pessoas com obesidade.

Os resultados do presente estudo revelaram também que cerca de 49% dos homens portugueses com nível educacional superior estão ativamente a tentar controlar o peso (comparando com 32% e 35% dos homens com nível educacional básico e secundário, respectivamente). O nível educacional tem sido consistentemente associado às tentativas

de controlo do peso em estudos populacionais, assim como a adesão às estratégias de saúde pública recomendadas para controlar o peso, com prevalências aumentadas à medida que aumentam os anos de escolaridade[11, 24]. Uma tendência associativa oposta tem sido encontrada para a prevalência de obesidade em adultos,[25, 26] incluindo na população portuguesa[2, 27]. Ou seja, a obesidade é marcadamente mais prevalente em pessoas de nível educacional (e socioeconómico) mais baixo. De facto, dados do presente estudo revelam que cerca de 47% e 64% dos indivíduos portugueses com pré-obesidade e obesidade, respectivamente, têm um nível educacional básico, sendo que apenas 23% e 12% destes mesmos indivíduos apresentam um nível educacional superior (dados não reportados). O nível educacional potencia não só um rendimento económico mais elevado, que permite uma maior aquisição de bens e serviços de saúde, mas também as competências cognitivas, assim como o acesso a informação relacionada com a saúde, os quais podem influenciar os comportamentos de saúde, incluindo os que afectam diretamente o peso corporal[25]. Reforça-se, por isso, a importância do desenvolvimento de estratégias de promoção do controlo do peso considerando as desigualdades ao nível da literacia da população portuguesa.

Os adultos portugueses que revelaram estar a tentar controlar o peso afirmaram fazê-lo recorrendo a várias estratégias do foro comportamental. É encorajador observar que as estratégias mais frequentemente utilizadas pela população adulta portuguesa para tentar controlar o peso vão de encontro às recomendações da Organização Mundial de Saúde, priorizadas na política da Carta Europeia de Luta Contra a Obesidade[1]. O consumo de hortícolas e sopa com regularidade, a água como bebida de eleição, a inclusão diária de pequeno-almoço e merendas nos intervalos das refeições principais, a prática regular de atividade física e a literacia alimentar e nutricional são estratégias integrantes do estilo de vida saudável promovido pelo Programa Nacional para a Promoção da Alimentação Saudável da Direção-Geral da Saúde[28]. É importante notar que as estratégias adoptadas com o intuito de perder e manter o peso foram sensivelmente as mesmas, tanto nos homens como nas mulheres, com exceção de seis estratégias consideradas especialmente úteis pelas mulheres na fase de perda de peso. Três destas estratégias – tomar suplementos alimentares para emagrecer (provavelmente sem recomendação específica), tomar laxantes ou diuréticos e induzir o vómito ou fazer jejum prolongado – e ainda, fazer dietas "da moda" (que usualmente são nutricionalmente desequilibradas) são estratégias potencialmente perigosas para a saúde, principalmente se mantidas a longo prazo. Apesar de terem sido adoptadas por uma pequena proporção de homens e mulheres, o que é

consistente com outros estudos epidemiológicos[11, 19, 29, 30], devem ser alvo de atenção por parte das entidades promotoras de saúde pois este tipo de estratégias tem sido associado a comportamentos de sobrealimentação, compulsão alimentar e a insucesso no que respeita ao controlo do peso[31-33].

Observaram-se diferenças específicas por sexo no que respeita à adopção de algumas estratégias para controlar o peso. Em contraste com outros estudos[11, 20, 30] em que a mesma proporção de homens e mulheres reportou praticar atividade física para tentar perder peso, em Portugal a prática de a atividade física é mais prevalente nos homens a tentar gerir o peso. Por outro lado, as mulheres reportaram mais frequentemente a utilização de estratégias relacionadas com o comportamento alimentar (por exemplo, comer pequenas porções) e algumas potencialmente nefastas para a saúde (por exemplo, toma de suplementos), estando em concordância com outros estudos[11, 19]. O conhecimento das estratégias escolhidas por homens e mulheres para tentar perder e manter o peso pode ser útil no delineamento de intervenções promotoras de comportamentos e estilos de vida saudáveis com vista ao controlo do peso nestes dois grupos populacionais em particular.

A mensagem de que a perda de peso tem um papel benéfico na saúde, prevenção de doenças e bem-estar geral parece ter sido bem aceite pela população portuguesa, visto serem as razões mais apontadas para tentar controlar o peso. Estudos internacionais apontam no mesmo sentido, tendo revelado que os motivos mais frequentemente citados pelos indivíduos para tentar perder peso é a saúde e o bem-estar[14, 30]. Talvez menos influenciados pela desejabilidade social do que os motivos de saúde, é de notar que motivos para controlar o peso relacionados com manter ou obter uma boa aparência física e melhorar a autoestima em relação ao corpo apresentam também valores muito elevados. Juntamente com a vontade de evitar ser discriminado ou sentir-se melhor integrado na sociedade, estes foram mais vezes referenciados pelas mulheres, tendo os homens mencionado mais frequentemente motivos relacionados com a melhoria da condição física ou para conseguir praticar desporto e cumprir requisitos específicos da profissão. Apesar destas diferenças significativas entre sexos, e de as mulheres estarem normalmente mais sujeitas a pressões culturais no que respeita ao corpo e ao controlo do peso[34], cerca de 80% dos homens portugueses que estão a tentar perder ou manter o peso fazem-no por questões relacionadas com a aparência e a autoestima em relação ao corpo, facto que também se verifica noutros estudos[30].

Os resultados deste estudo devem ser interpretados considerando que as medidas utilizadas foram auto-reportadas. O viés associado à desejabilidade social[35] pode aumentar

a indicação da utilização de estratégias comportamentais mais saudáveis para tentarem controlar o peso (por exemplo, prática de atividade física) e reduzir a indicação da utilização de estratégias menos saudáveis (por exemplo, indução do vómito ou jejum prolongado) por parte de alguns indivíduos. O autorrelato do peso e altura também pode levantar questões relativamente à acurácia dos valores de IMC. Os homens tendem a sobre-reportar o peso e a altura, enquanto que as mulheres tendem a sub-reportar o peso e a sobre-reportar a altura,[36, 37] estatísticas que são ainda mais pronunciadas quando os dados são recolhidos por entrevista telefónica[38]. Assim, o autorrelato destas medidas pode levar a uma sub- ou sobre-estimação da prevalência de peso normal, pré-obesidade e obesidade. Contudo, alguns estudos sugerem que o peso auto-reportado se correlaciona de forma elevada com o peso medido objectivamente[39]. Outra limitação deste estudo é o facto de não avaliar a eficácia das estratégias comportamentais utilizadas, o que deve ser considerado em estudos futuros. Apesar destas limitações, este estudo destaca-se por ser constituído por uma amostra representativa nacional, permitindo desta forma a generalização dos resultados para a população adulta portuguesa.

Conclusões

Mais de um terço dos adultos portugueses estão ativamente a tentar controlar o peso, sendo que a maioria reporta utilizar estratégias comportamentais consistentes com as recomendações de saúde pública. Foram identificadas estratégias comportamentais, no âmbito da alimentação e da atividade física, e motivos específicos por sexo. Esta investigação contribui, assim, para a compreensão dos processos associados ao fenómeno da gestão do peso em Portugal, alertando para o desenvolvimento de estratégias de prevenção da obesidade apropriadas à população nacional.

Agradecimentos

Os autores agradecem à Unidade de Epidemiologia do Instituto de Medicina Preventiva da Faculdade de Medicina da Universidade de Lisboa, em especial a Violeta Alarcão, pela colaboração no processo de planeamento e recolha dos dados.

Fontes de financiamento

Este estudo foi apoiado pela Fundação para a Ciência e a Tecnologia (SFRH/BD/80739/2011 atribuída a Inês Santos).

Referências

1. World Health Organization European Charter on counteracting obesity. WHO European Ministerial Conference on Counteracting Obesity: Diet and physical activity for health. Istanbul, Turkey: WHO; 2006.
2. Sardinha LB, Santos DA, Silva AM, Coelho-e-Silva MJ, Raimundo AM, Moreira H, et al. Prevalence of overweight, obesity, and abdominal obesity in a representative sample of Portuguese adults. PLoS One. 2012;7(10):e47883.
3. Jensen MD, Ryan DH, Apovian CM, Ard JD, Comuzzie AG, Donato KA, et al. 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. J Am Coll Cardiol. 2014;63:2985-3023.
4. Powell LH, Calvin JE. Effective obesity treatments. Am Psychol. 2007;62(3):234-46.
5. Wadden TA, Phelan S. Behavioral assessment of the obese patient. In: Wadden TA, Stunkard AJ, editors. Handbook of obesity treatment. New York: Guilford Press; 2002. p. 186-226.
6. National Institute for Health and Care Excellence (NICE). Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children. London: NICE; 2006 [consultado 2014 Dez 3]; Disponível em: http://www.nice.org.uk/guidance/cg43.
7. Andreyeva T, Long MW, Henderson KE, Grode GM. Trying to lose weight: diet strategies among Americans with overweight or obesity in 1996 and 2003. J Am Diet Assoc. 2010;110(4):535-42.
8. Yaemsiri S, Slining MM, Agarwal SK. Perceived weight status, overweight diagnosis, and weight control among US adults: the NHANES 2003-2008 Study. Int J Obes (Lond). 2011;35(8):1063-70.

9. Korkeila M, Rissanen A, Kaprio J, Sorensen TI, Koskenvuo M. Weight-loss attempts and risk of major weight gain: a prospective study in Finnish adults. Am J Clin Nutr. 1999;70(6):965-75.
10. Jackson SE, Wardle J, Johnson F, Finer N, Beeken RJ. The impact of a health professional recommendation on weight loss attempts in overweight and obese British adults: a cross-sectional analysis. BMJ Open. 2013;3(11):e003693.
11. Kruger J, Galuska DA, Serdula MK, Jones DA. Attempting to lose weight: specific practices among U.S. adults. Am J Prev Med. 2004;26(5):402-6.
12. Williams L, Germov J, Young A. Preventing weight gain: a population cohort study of the nature and effectiveness of mid-age women's weight control practices. Int J Obes (Lond). 2007;31(6):978-86.
13. O'Brien K, Venn BJ, Perry T, Green TJ, Aitken W, Bradshaw A, et al. Reasons for wanting to lose weight: different strokes for different folks. Eat Behav. 2007;8(1):132-5.
14. Hankey CR, Leslie WS, Lean ME. Why lose weight? Reasons for seeking weight loss by overweight but otherwise healthy men. Int J Obes Relat Metab Disord. 2002;26(6):880-2.
15. Instituto Nacional de Estatística IP. Inquérito às Despesas das Famílias 2010/2011. Lisboa, Portugal: Instituto Nacional de Estatística, I.P.2012.
16. Graffar M. Une méthode de classification sociale d'echantillons de population. Courier. 1956;6:4.
17. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. WHO Technical Report Series. 2000;894:i-xii, 1-253.
18. Santos O, Sermeus G, Carmo Id, Anelli M, Kupers P, Martin E. In search of weight loss - a four-country survey on what people were doing for losing weight at the turn of the century. Endocrinologia, Diabetes & Obesidade. 2010;4(1):21-31.
19. Serdula MK, Williamson DF, Anda RF, Levy A, Heaton A, Byers T. Weight control practices in adults: results of a multistate telephone survey. Am J Public Health. 1994;84(11):1821-4.
20. Serdula MK, Mokdad AH, Williamson DF, Galuska DA, Mendlein JM, Heath GW. Prevalence of attempting weight loss and strategies for controlling weight. JAMA. 1999;282(14):1353-8.

21. Villanueva EV. The validity of self-reported weight in US adults: a population based cross-sectional study. BMC Public Health. 2001;1:11.
22. Wooley SC, Garner DM. Obesity treatment: the high cost of false hope. J Am Diet Assoc. 1991;91(10):1248-51.
23. Johnson CC, Myers L, Webber LS, Hunter SM. Learned helplessness with excess weight and other cardiovascular risk factors in children. Am J Health Behav. 1997;21(1):51-59.
24. Bish CL, Blanck HM, Serdula MK, Marcus M, Kohl HW, Khan LK. Diet and physical activity behaviors among Americans trying to lose weight: 2000 Behavioral Risk Factor Surveillance System. Obes Res. 2005;13(3):596-607.
25. Yu Y. Educational differences in obesity in the United States: a closer look at the trends. Obes (Silver Spring). 2012;20(4):904-8.
26. Roskam AJ, Kunst AE, Van Oyen H, Demarest S, Klumbiene J, Regidor E, et al. Comparative appraisal of educational inequalities in overweight and obesity among adults in 19 European countries. Int J Epidemiol. 2010;39(2):392-404.
27. Marques-Vidal P, Paccaud F, Ravasco P. Ten-year trends in overweight and obesity in the adult Portuguese population, 1995 to 2005. BMC Public Health. 2011;11:772.
28. Direção-Geral da Saúde. Programa Nacional para a Promoção da Alimentação Saudável. Lisboa: DGS; [consultado 2014 Abril 22]. Disponível em: http://www.alimentacaosaudavel.dgs.pt.
29. Timperio A, Cameron-Smith D, Burns C, Crawford D. The public's response to the obesity epidemic in Australia: weight concerns and weight control practices of men and women. Public Health Nutr. 2000;3(4):417-24.
30. Crawford D, Owen N, Broom D, Worcester M, Oliver G. Weight-control practices of adults in a rural community. Aust N Z J Public Health. 1998;22(1):73-9.
31. Birch LL, Fisher JO, Davison KK. Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. Am J Clin Nutr. 2003;78(2):215-20.
32. Field AE, Manson JE, Laird N, Williamson DF, Willett WC, Colditz GA. Weight cycling and the risk of developing type 2 diabetes among adult women in the United States. Obes Res. 2004;12(2):267-74.
33. Nicklas JM, Huskey KW, Davis RB, Wee CC. Successful weight loss among obese U.S. adults. Am J Prev Med. 2012;42(5):481-5.

34. Rodin J. Cultural and psychosocial determinants of weight concerns. Ann Intern Med. 1993;119(7 Pt 2):643-5.
35. Tourangeau R, Yan T. Sensitive questions in surveys. Psychol Bull. 2007;133(5):859-83.
36. Merrill RM, Richardson JS. Validity of self-reported height, weight, and body mass index: findings from the National Health and Nutrition Examination Survey, 2001-2006. Prev Chronic Dis. 2009;6(4):A121.
37. Oliveira A, Ramos E, Lopes C, Barros H. Self-reporting weight and height: misclassification effect on the risk estimates for acute myocardial infarction. Eur J Public Health. 2009;19(5):548-53.
38. Yun S, Zhu BP, Black W, Brownson RC. A comparison of national estimates of obesity prevalence from the behavioral risk factor surveillance system and the National Health and Nutrition Examination Survey. Int J Obes (Lond). 2006;30(1):164-70.
39. Fitzgibbon ML, Stolley MR, Kirschenbaum DS. Obese people who seek treatment have different characteristics than those who do not seek treatment. Health Psychol. 1993;12(5):342-5.

CHAPTER 4

Weight Control Behaviors of Highly Successful Weight Loss Maintainers: The Portuguese Weight Control Registry (Study III)[4]

[4] **Santos I,** Vieira PN, Silva MN, Sardinha LB, Teixeira PJ. (2016). Weight control behaviors of highly successful weight loss maintainers: The Portuguese Weight Control Registry. Journal of Behavioral Medicine, DOI 10.1007/s10865-016-9786-y. (IF: 2.227)

Abstract

To describe key behaviors reported by participants in the Portuguese Weight Control Registry and to determine associations between these behaviors and weight loss maintenance. A total of 388 adults participated in this cross-sectional study. Assessments included demographic information, weight history, weight loss and weight maintenance strategies, dietary intake, and physical activity. Participants lost on average 18kg, which they had maintained for ~28months. Their average dietary intake was 2199kcal/day, with 33% of energy coming from fat. About 78% of participants engaged in levels of moderate-plus-vigorous physical activity exceeding 150min/week (51% above 250min/week), with men accumulating 82 more minutes than women ($p<0.05$). The most frequently reported strategies for both weight loss and maintenance were keeping healthy foods at home, consuming vegetables regularly, and having daily breakfast. Greater weight loss maintenance was associated with higher levels of physical activity, walking, weight self-monitoring, establishing specific goals, and with reduced portion size use, reduced consumption of carbohydrates, and increased consumption of protein, ($p<0.05$). Results indicate that weight loss maintenance is possible through the adoption of a nutritionally-balanced diet and regular participation in physical activity, but also suggest that adopting different (and, to a degree, individualized) set of behavioral strategies is key for achieving success.

Keywords: Weight loss; Weight maintenance; Strategies; Behaviors; Weight Control Registry

Introduction

Long-term weight loss maintenance is a critical yet elusive goal for many individuals (Stevens et al., 2006). Interventions combining diet, exercise, and behavior change strategies show some success but weight lost is typically regained within a few years (Powell & Calvin, 2007). However, up to 20% of individuals with excess weight are able to lose at least 5% of their initial body weight and maintain it for many years (Wing & Hill, 2001). The US National Weight Control Registry (NWCR) is one of the richest databases detailing the characteristics of successful weight loss maintainers, highlighting a number of psychological and behavioral factors which may serve as guidance for others attempting to lose weight (Catenacci et al., 2008; Ogden et al., 2012). With the exception of Germany (Feller et al., 2015), Portugal is presumably the only other nation with a comparable weight control registry (Vieira et al., 2012; Vieira et al., 2014). The Portuguese Weight Control Registry (PWCR) was established in 2008 and consists of an ongoing voluntary registry of adults who have been successful at losing at least 5 kg and have kept it off for 1 year or more. Despite the specificities of each registry regarding the minimum amount of weight loss for eligibility (13.6 kg in the NWCR; 10% in the German Weight Control Registry [GWCR]), all registries were set with the same goal of studying long-term successful maintenance of weight loss. The PWCR allows the investigation of characteristics and mechanisms behind successful weight loss maintenance in the Portuguese population. Given that social, environmental and cultural influences are thought to contribute to obesity (Heitmann et al., 2012), studying successful weight loss maintainers from different populations may provide further insights into weight loss and maintenance-related processes in general, while also be informative to guide interventions and policy in that specific country and environment. The purpose of this brief report is to describe the dietary intake and physical activity behaviors of the current group of PWCR participants, report on their use of specific strategies, and analyze associations between weight control behaviors and weight loss maintenance. Because weight control behaviors may differ between men and women (Kiefer et al., 2005), gender differences were also tested.

Methods

Subjects

Recruitment strategies included a PWCR website, a PWCR Facebook page, and local and national media coverage and advertisements. Interested individuals were invited to contact the research team by telephone or e-mail or to register online. This registration included a screening questionnaire with information on personal weight history, to determine whether they meet the eligibility criteria. To be eligible for enrolment in the registry, individuals had to have Portuguese nationality, be aged between 18 and 65 years, and have maintained at least a 5 kg intentional weight loss for at least 1 year (independently of their initial body weight). This weight loss criterion was chosen because i) in Portugal, a 5 kg weight loss represents more than 5% weight loss for most overweight individuals (based on Carmo et al., 2008 and Sardinha et al., 2012)), and the guidelines for the management of overweight and obesity in adults show that a sustained weight loss of 3-5% is likely to result in clinically meaningful health benefits (Jensen et al., 2014); ii) 5 kg represents a realistic weight loss goal for many individuals involved in lifestyle weight management interventions (e.g., Teixeira et al., 2010); and iii) 5 kg is a clear and recognizable number for advertisement and recruitment purposes. To further ensure eligibility criteria, individuals were asked to provide the contact of a health professional, family member, or friend who could confirm their weight loss.

Individuals who met the eligibility criteria were then invited to visit the Exercise and Health Laboratory of the Faculty of Human Kinetics, University of Lisbon, for assessments. If they were not able to visit the University facilities, a (partial) battery of questionnaires was sent by mail. A written informed consent was obtained before any assessment. To date, 388 individuals (64% women) enrolled in the registry, of which 225 have completed laboratory assessments. There were no differences in the demographic characteristics between those who completed laboratory assessments and those who completed mailed questionnaires.

It should be noted that for the PWCR to have the same number of participants as the US NWCR (using as relative proportion the number of obese adults in both countries (WHO Global Infobase, 2016)), it would have to recruit approximately 71 participants. Currently, the number of PWCR participants is nearly five times higher suggesting a level of representativeness at least comparable, if not superior, to the US study. Unfortunately,

the study population under scrutiny – nationwide successful weight loss maintainers – has not been quantified in either the US or Portugal.

Assessments

Upon entering the PWCR, participants completed a questionnaire with standard demographic information, details about weight history, and specific weight loss and weight maintenance strategies which included a series of statements about dietary habits (e.g., "consumed vegetables", "included healthy snacks in between meals") and other behaviors (e.g., "self-monitored body weight", "used stairs rather than the elevator") answered on a 5-point Likert scale (1=never to 5=always) (see Supplementary material 1 for a detailed description of the weight loss and maintenance strategies). In the laboratory, weight and height were measured according to standard procedures (World Health Organization, 1995). Using current weight and the maximum previous weight (self-reported), current and maximum body mass index (BMI), and the magnitude of weight loss were calculated. Dietary intake was assessed using a previously validated (Lopes, 2000; Lopes et al., 2007) semi-quantitative food-frequency questionnaire. Physical activity was assessed using the widely-used Paffenbarger Physical Activity Questionnaire (PPAQ) (Paffenbarger et al., 1978), and through accelerometry in a sub-sample (see Supplementary material 2 for information on assessment instruments). There were no differences in the demographic characteristics between those who wore an accelerometer and those who did not. The study was approved by the Ethics Committee of the Faculty of Human Kinetics, University of Lisbon.

Statistical Analysis

Statistical analyses were carried out using IBM SPSS version 22. Significance level was set at $p < 0.05$ for all tests. Independent-sample *t* tests for continuous variables and chi-square tests for categorical variables were used to compare gender differences. McNemar's test was used to compare weight loss and weight maintenance strategies. To test the moderation effect of gender on the association between percentage of weight lost and dietary intake-related variables, physical activity-related variables, and weight loss and weight maintenance strategies, univariate General Linear Models were conducted. Homogeneity of variance and normality of residuals were tested. Because residuals were not normal, the dependent variable (percentage of weight lost) was transformed using a logarithmic function (natural logarithm), bringing each model into compliance with the

assumptions of General Linear Models. If there was a significant interaction effect, the sample was stratified by gender and Pearson correlations were performed to examine associations within each group; if the interaction effect was not significant, partial correlations were used to explore these associations while controlling for gender. Since variability is common among physical activity and nutritional variables, only the most extreme values (outliers = mean +/- 4 SD) were excluded from analyses.

Results

On average, participants were 39 years old, and most were married and had completed higher education (Table 1). About 10% of individuals had normal weight, 24% were overweight and 66% were obese before their successful weight loss. Participants lost, on average, 18.3 kg or 18.7% of initial body weight (men: 19.9%; women: 17.8%; $p>0.05$). After weight loss, 39% of participants had normal weight, 42% were overweight and 19% were obese. PWCR members reported, on average, having maintained the weight loss for ~28 months.

Participants reported an average dietary intake of 2199 kcal/day (with men consuming ~230 kcal more than women, $p<0.05$), with 19.4% of energy coming from protein, 47.4% from carbohydrates, and 33.2% from fat. Daily fiber intake was, on average, 30.5g. PWCR' participants reported 292±267 min/week of moderate-plus-vigorous physical activity (MVPA, $p=0.025$ favoring men) (see Table 1). In a sub-sample of participants (n=168), objectively measured MVPA was 284±170 min/week (men: 321±182; women: 259±157 min/week; $p=0.019$). There was a large variability in individual MVPA, ranging from 20 min/week to 781 min/week, with 22% of participants engaging in less than 150 min/week (Figure 1). Additionally, average sedentary time was 7749±567 min/week (roughly 1107 min/day including sleeping time).

Overall, the most frequently reported weight loss and maintenance strategies were *having healthy foods available at home*, *consuming vegetables* and *eating breakfast daily* (see Supplementary material 1). More participants reported *selecting foods consciously*, *reducing portions size*, *establishing specific goals*, *reducing the consumption of foods rich in carbohydrates*, *decreasing meals at restaurants*, *recording dietary intake and/or physical activity*, *counting calories*, and *consuming weight loss supplements* and *meal substitutes* for weight loss, while for weight loss maintenance more participants reported

having healthy foods available at home, *eating breakfast daily*, *consuming fiber-rich foods*, and *increasing the consumption of protein-rich foods* ($p < 0.05$).

Table 1. Participants' characteristics

	All	Men	Women
Demographic	*(n=388)*	*(n=142)*	*(n=246)*
Age	39.0 ± 11.1	40.2 ± 11.0	38.3 ± 11.1
Education (%)			
Junior high or bellow	8.9	10.7	7.9
High school	22.0	21.4	22.3
University degree	69.1	67.9	69.8
Marital status (%)			
Single	33.4	25.0	38.2
Married/union	54.6	65.0	48.8 [b]
Divorced/widow	12.0	10.0	13.0
Weight history	*(n=225)*	*(n=88)*	*(n=137)*
Maximum weight (kg)	92.5 ± 20.4	104.6 ± 19.4	84.4 ± 16.8 [a]
Maximum BMI (kg/m^2)	33.1 ± 6.4	34.7 ± 5.9	32.0 ± 6.5 [b]
Current weight (kg)	74.1 ± 13.4	82.3 ± 11.5	68.7 ± 11.7 [a]
Current BMI (kg/m^2)	26.6 ± 4.2	27.3 ± 3.6	26.2 ± 4.5 [c]
Weight loss (kg)	18.3 ± 12.5	22.1 ± 14.2	15.8 ± 10.6 [b]
Maintenance (months)	28.3 ± 29.6	27.4 ± 22.7	28.9 ± 33.5
Dietary intake			
Energy (kcal/day)	2199 ± 840	2341 ± 867	2108 ± 813 [c]
Protein (% kcal/day)	19.4 ± 3.6	19.4 ± 3.5	19.4 ± 3.6
Carbohydrates (% kcal/day)	47.4 ± 7.6	47.1 ± 6.8	47.6 ± 8.0
Fat (% kcal/day)	33.2 ± 6.5	33.4 ± 5.7	33.0 ± 7.1
Dietary fiber (g/day)	30.5 ± 13.7	31.6 ± 15.6	29.9 ± 12.4
Physical activity			
MVPA (min/week)	292 ± 267	341 ± 279	259 ± 255 [c]

Note: Data reported as mean ± s.d.; [a] $p < 0.001$; [b] $p < 0.01$; [c] $p < 0.05$; (Independent-sample t test for between-group comparisons)

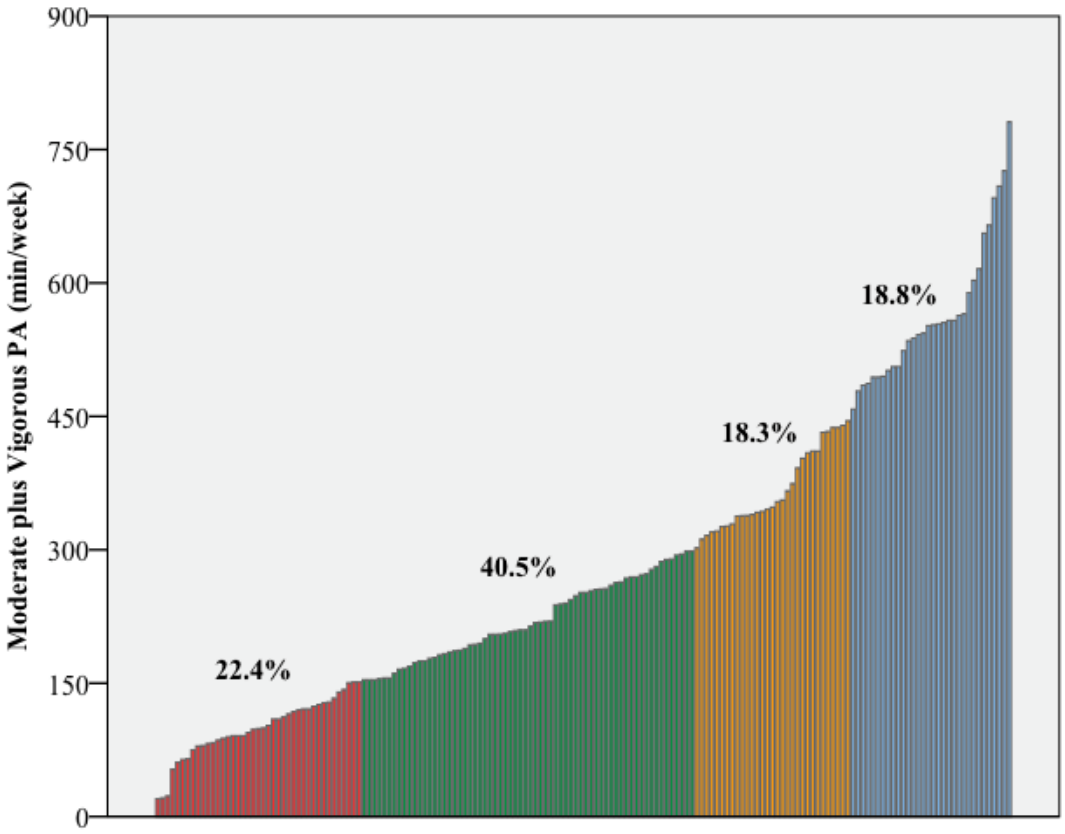


Figure 1 – Minutes of moderate-plus-vigorous physical activity per week, measured by accelerometry. Bars represent individual participants. Different colours indicate thresholds of 150, 300, and 450 min/week.

To achieve weight loss, there were significant gender differences for *establishing specific goals* (p=0.012, favoring men) and *reducing culinary fat* (p=0.014, favoring women). To maintain weight, more men engaged in *regular physical activity* and *recorded their dietary intake and/or physical activity* (p<0.001), and more women *included healthy snacks in between meals*, *reduced portions size* and *decreased meals at restaurants* (p<0.05).

Gender significantly moderated the association between percentage of weight loss maintenance and energy intake[5] (p = 0.018), protein intake (p = 0.001), *reducing sugary foods* as a weight *loss* strategy (p = 0.004), *having healthy foods available at home* as a weight *maintenance* strategy (p = 0.009) and *keeping dietary intake and/or physical activity records* for both weight *loss* (p = 0.048) and weight *maintenance* (p = 0.039). After splitting the sample, the percentage of weight loss maintenance was positively associated

[5] Energy intake adjusted for initial body weight before weight loss (expressed in energy/kg/day).

with protein intake (r = 0.28, p = 0.004), *reducing sugary foods* as a weight *loss* strategy (r = 0.27, p = 0.004), *having healthy foods available at home* as a weight *maintenance* strategy (r = 0.20, p = 0.031), and *keeping dietary intake and/or physical activity records as* a weight *maintenance* strategy (r = 0.30, p = 0.001) only in women. Additionally, after controlling for the effect of gender, positive significant associations were observed between percentage of weight loss maintenance and MVPA (by accelerometry, r = 0.20, p = 0.015), *monitoring weight* (r = 0.14, p = 0.049), and *walking instead of driving/taking public transportation* (r = 0.18, p = 0.011) for *losing* weight; *reducing portions size* (r = 0.26, $p < 0.001$) for *maintaining* weight; and *establishing specific goals* (r = 0.20, p = 0.006; r = 0.23, p = 0.001), *reducing the consumption of carbohydrates-rich foods* (r = 0.21, p = 0.003; r = 0.20, p = 0.006), and *increasing the consumption of protein-rich foods (*r = 0.18, p = 0.013; r = 0.15, p = 0.033) for weight *loss* and weight *maintenance,* respectively. *Consuming weight loss supplements* as a strategy for *maintaining* weight was negatively associated with the percentage of weight loss maintenance (r = -0.15, p = 0.039).

Discussion

This is one of the first studies outside of North America to describe the characteristics of individuals who are successful at losing *and maintaining* weight loss. On average, participants had lost about 18 kg (19% of their initial body weight) and had maintained this weight loss for about 28 months. Before losing weight, the majority of PWRC members was obese; after their weight loss, about 80% were placed in the overweight or normal weight category.

The dietary pattern of the average PWCR participant generally meets the Acceptable Macronutrient Distribution Ranges recommended for the population (10-35% protein, 45-65% carbohydrates, 20-35% total fat) (Institute of Medicine, 2005). Similar results were found in the NWCR participants, although they reveal a higher intake of carbohydrates and a lower intake of fat (Phelan, Wyatt, Hill & Wing, 2006). In the PWCR, fat represented a considerable proportion of the daily energy intake in both men and women (33%), potentially due to the typical Mediterranean diet in Portugal, which is rich in olive oil. Another characteristic of this diet is that it provides a substantial amount of fiber-rich foods and the average participant clearly passed the recommended value (e.g.,

25g fiber/day, European Food Safety Authority (EFSA Panel on Dietetics Products, Nutrition, and Allergies, 2010)). Higher protein intake (which improves satiety (Paddon-Jones et al., 2008)) was positively associated with the percentage of weight loss maintenance in women, in line with previous studies (e.g.,(Westerterp-Plantenga et al., 2004)).

Regarding physical activity, the average PWCR member engaged in a relatively high level of MVPA (284 min/week or roughly 40 min/day), meeting the ACSM's recommended levels for weight loss maintenance (>250 min/week) (Donnelly et al., 2009). Importantly, partial correlation analyses also showed a positive association between minutes of MVPA and the magnitude of weight loss maintenance, independent of gender. These results are in line with findings from the US registry showing physical activity as a key strategy for long-term weight control (Ogden, et al., 2012). However, it should be noted that there is a sizable group of participants who was able to lose and maintain weight with less than 250 min/week of MVPA, indicating that the amount of physical activity necessary to achieve energy balance is highly individual. These findings suggest that physical activity prescription in real contexts should move beyond generalized guidelines (e.g. 250 min/week as a fixed target) and consider individual characteristics (Teixeira, et al., 2011).

Participants adopted a large range of strategies to reduce and maintain weight. Some strategies were more consistently associated with success in women such as reducing sugary foods for weight loss, having healthy foods available at home for weight loss maintenance, and recording dietary intake and physical activity for weight loss maintenance. This notwithstanding, other strategies were associated with success independent of gender, including monitoring weight and walking instead of taking transports for weight loss, and reducing portions size for weight loss maintenance. Importantly, establishing specific goals, reducing the consumption of carbohydrates-rich foods and increasing the consumption of protein-rich foods seem to be key for success in both weight loss and maintenance. Using weight loss supplements (used by a tenth of participants) was negatively associated with weight loss maintenance, perhaps because this could mitigate the use of other healthier and more successful strategies or individuals might start to use this strategy when they experience weight gain. The variety of strategies adopted suggests that there is no "one size fits all" approach for weight loss and maintenance. This was illustrated in a recent study from the NWCR (Ogden, et al., 2012) where several distinct profiles of success were identified.

Finally, it is noteworthy that most of the strategies highly used by the PWCR members to *lose* weight were maintained in the long run. The limitations of the cross-sectional analysis notwithstanding, these results suggest that long-term weight management may consist of a continuous process of behavior change, perhaps involving similar behaviors and predictors, instead of being two separate processes (i.e., loss *and* maintenance). Alternatively, this could indicate that, while reporting that they are in weight loss maintenance, participants could still wish to lose additional weight. To the extent this occurs, it could also explain a similarity in responses to weight loss versus weight maintenance strategies.

In summary, this manuscript provides novel information regarding dietary and physical activity patterns and behavioral strategies contributing to long-term weight loss maintenance of Portuguese individuals. With this data, there is now evidence in different countries to suggest that individuals can be successful at losing weight and keeping it off, through a number of different (and, to a degree, individualized) set of behavioral strategies, which should be considered in weight management interventions. Considering the generalized assumption that long-term weight control is rare and exceedingly difficult, an important implication from these collective findings is that such thinking is not at par with reality and that interventions, small and large, can continue to be improved with the aim of increasing the number of individuals who reach the level of success reported by "losers" in these studies. Further exploration of the lifestyle patterns of Portuguese successful weight loss maintainers, through profiling methodologies, could be useful for tailoring future weight management interventions to the specific characteristics or profiles of individuals wishing to lose weight and therefore improve long-term results in obesity treatment.

Acknowledgments

This study was funded by grants from the Portuguese Science and Technology Foundation (PTDC/DES/72317/2008-2011 and SFRH/80739/2011 to the first author). The authors are grateful to the Oeiras City Council for its additional financial support.

The authors want to acknowledge Susana Cunha for her participation in data collection.

References

Carmo, I., Santos, O., Camolas, J., Vieira, J., Carreira, M., Medina, L., … Galvão-Teles, A. (2008). Overweight and obesity in Portugal: national prevalence in 2003-2005. *Obesity Reviews, 9*, 11-19.

Catenacci, V. A., Ogden, L. G., Stuht, J., Phelan, S., Wing, R. R., Hill, J. O., & Wyatt, H. R. (2008). Physical activity patterns in the National Weight Control Registry. *Obesity*, *16*(1), 153-161.

Donnelly, J. E., Blair, S. N., Jakicic, J. M., Manore, M. M., Rankin, J. W., & Smith, B. K. (2009). American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. *Medicine and Science in Sports and Exercise, 41*(2), 459-471.

EFSA Panel on Dietetics Products, Nutrition, and Allergies (NDA). (2010). Scientific opinion on establishing food-based dietary guidelines. *EFSA Journal, 8*(3), 1460.

Feller, S., Muller, A., Mayr, A., Engeli, S., Hilbert, A., & de Zwaan, M. (2015). What distinguishes weight loss maintainers of the German Weight Control Registry from the general population? *Obesity (Silver Spring), 23*(5), 1112-1118.

Heitmann, B. L., Westerterp, K. R., Loos, R. J. F., Sorensen, T. I., Dea, K. O., Mc Lean, P., …Westerterp-Plantenga, M. S. (2012). Obesity: lessons from evolution and the environment. *Obesity Reviews, 13*(10), 910-922.

Institute of Medicine. (2005). *Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids*. Washington D.C.: The National Academies Press.

Jensen, M. D., Ryan, D. H., Apovian, C. M., Ard, J. D., Comuzzie, A. G., Donato, K. A., … Yanovski, S. Z. (2014). 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. *Circulation*, 129(25 Suppl 2), S102-138.

Kiefer, I., Rathmanner, T., & Kunze, M. (2005). Eating and dieting differences in men and women. *The Journal of Men's Health & Gender, 2*(2), 194-201.

Lopes, C. (2000). *Reprodutibilidade e validação de um questionário semi-quantitativo de frequência alimentar. In: Alimentação e enfarte agudo do miocárdio: um estudo caso-controlo de base populacional.* Universidade do Porto, Porto, pp. 79-115.

Lopes, C., Aro, A., Azevedo, A., Ramos, E., & Barros, H. (2007). Intake and adipose tissue composition of fatty acids and risk of myocardial infarction in a male Portuguese community sample. *Journal of the American Dietetic Association, 107*(2), 276-286.

Ogden, L. G., Stroebele, N., Wyatt, H. R., Catenacci, V. A., Peters, J. C., Stuht, J., . . . Hill, J. O. (2012). Cluster Analysis of the National Weight Control Registry to Identify Distinct Subgroups Maintaining Successful Weight Loss. *Obesity, 20*(10), 2039-2047.

Paddon-Jones, D., Westman, E., Mattes, R. D., Wolfe, R. R., Astrup, A., & Westerterp-Plantenga, M. (2008). Protein, weight management, and satiety. *American Journal of Clinical Nutrition, 87*(5), 1558s-1561s.

Paffenbarger, R. S., Jr., Wing, A. L., & Hyde, R. T. (1978). Physical activity as an index of heart attack risk in college alumni. *American Journal of Epidemiology, 108*(3), 161-175.

Phelan, S., Wyatt, H. R., Hill, J. O., Wing, R. R. (2006). Are the eating and exercise habits of successful weight losers changing? *Obesity, 14*(4), 710-716.

Powell, L. H., & Calvin, J. E. (2007). Effective obesity treatments. *American Psychologist, 62*(3), 234-246.

Sardinha, L. B., Santos, D. A., Silva, A. M., Coelho-e-Silva, M. J., Raimundo, A. M., Moreira, H., … Mota, J. (2012). Prevalence of overweight, obesity, and abdominal obesity in a representative sample of Portuguese adults. *PLoS ONE*, 7(10): e47883.

Stevens, J., Truesdale, K. P., McClain, J. E., & Cai, J. (2006). The definition of weight maintenance. *International Journal of Obesity, 30*(3), 391-399.

Teixeira, P. J., Silva, M. N., Coutinho, S. R., Palmeira, A. L., Mata, J., Vieira, P. N., … Sardinha, L. B. (2010). Mediators of weight loss and weight loss maintenance in middle-aged women. *Obesity,* 18, 725-735.

Teixeira, P. J., Stubbs, R. J., King, N. A., Whybrow, S., & Blundel, J. E. (2011). Obesity. In J. M. Saxton (Ed.), *Exercise and Chronic Disease: An Evidence-Based Approach*. London: Routledge.

Vieira, P. N., Silva, M. N., Coutinho, S. R., Santos, T. C., Santos, I., Sardinha, L. B., & Teixeira, P. J. (2012). Successful weight loss maintenance in Portugal and in the USA: comparing results from two National Weight Control Registries [Portuguese]. *Revista Portuguesa de Saúde Pública, 30*(2), 115-124.

Vieira, P. N., Teixeira, P., Sardinha, L. B., Santos, T., Coutinho, S., Mata, J., & Silva, M. N. (2014). Success in maintaining weight loss in Portugal: The Portuguese Weight Control Registry. *Ciencia & Saude Coletiva, 19*(1), 83-92.

Westerterp-Plantenga, M. S., Lejeune, M. P., Nijs, I., van Ooijen, M., & Kovacs, E. M. (2004). High protein intake sustains weight maintenance after body weight loss in humans. *International Journal of Obesity, 28*(1), 57-64.

Wing, R. R., & Hill, J. O. (2001). Successful weight loss maintenance. *Annual Review of Nutrition, 21*, 323-341.

World Health Organization, 1995. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Commitee, WHO Technical Report Series 854. Geneva: WHO.

World Health Organization. WHO Global Infobase. Retrieved February 29, 2016, from https://apps.who.int/infobase/Index.aspx

SUPPLEMENTARY MATERIAL 1

Table 2. Strategies used by PWCR participants to achieve weight loss and weight maintenance

Reported Strategies	Weight Loss			Weight Maintenance		
	All	Men	Women	All	Men	Women
Healthy foods available at home (e.g., fruit, vegetables)	92.7	92.1	93.0	96.9 [1 b]	95.7	97.6
Vegetables consumption	90.1	88.6	90.9	88.8 [3]	87.9	89.3
Regular breakfast intake	89.8	91.4	88.9	96.6 [2 a]	97.9	95.9
Reduce fatty foods	86.7	85.1	87.7	86.0 [4]	81.6	88.5
Reduce sugary foods	86.5	82.3	88.9	84.1 [5]	79.3	86.9
Reduce fat in meals/confection/seasonings	84.1	77.9	87.7 [c]	83.8 [6]	79.9	86.1
Conscious food selection (e.g., read food labels)	79.8	78.0	80.9	72.7 [9 b]	67.4	75.7
Healthy snacks in between meals (e.g., mid-morning)	79.4	76.4	81.1	80.8 [8]	75.2	84.1 [c]
Reduce portions size	78.3	73.6	81.1	64.6 [12 b]	57.1	68.9 [c]
Fiber-rich foods consumption (e.g., whole cereals or bread)	77.0	74.5	78.5	83.6 [7 b]	86.5	81.9
Monitoring body weight	74.5	80.0	71.3	-	-	-
Replace caloric sauces for less-caloric alternatives (e.g., squeezed lemon juice)	66.1	62.6	68.0	69.8 [10]	63.6	73.4
Establishing specific goals (e.g., regarding weight loss, physical activity participation)	60.6	69.1	55.7 [c]	49.1 [14 b]	53.2	46.7

Regular soup intake	50.5	52.9	49.2	50.3 [13]	53.6	48.4
Reduce/eliminate carbohydrates-rich foods (e.g., rice, pasta)	47.9	45.3	49.4	35.4 [16 b]	32.1	37.3
Using stairs rather than elevators	45.7	45.4	45.9	-	-	-
Decrease meals at restaurants	45.4	43.1	46.7	25.3 [17 b]	16.5	30.3 [b]
Walk instead of driving/taking public transportation	38.0	29.3	43.1	-	-	-
Increase protein-rich foods (e.g., eggs, fish, meat)	36.0	40.3	33.5	43.5 [15 b]	49.6	39.9
Dietary intake and/or physical activity records	27.2	32.1	24.3	18.1 [18 b]	27.7	12.7 [a]
Counting calories	20.4	19.4	20.9	14.9 [19 b]	15.8	14.3
Parking away from destination	20.4	17.8	22.0	-	-	-
Regular physical activity	-	-	-	67.5 [11]	78.6	61.2 [a]
Weight loss supplements consumption	15.1	17.1	14.0	11.5 [20 c]	12.9	10.6
Meal substitutes consumption (e.g., shakes, bars)	11.3	12.9	10.3	8.1 [21 b]	10.8	6.6

Note: Data reported as percentages. Values correspond to the responses “often” and “always” for each strategy. The superscript numbers correspond to descending order. The lack of values in some strategies is due to their absence in the questionnaire. [a] p <0.001; [b] p <0.01; [c] p <0.05 (Chi-square test for gender comparisons; McNemar’s test for between-group (loss vs. maintenance) comparisons).

SUPPLEMENTARY MATERIAL 2

The *semi-quantitative food-frequency questionnaire* (covering the 12 months preceding the interview) consists of a list of 86 foods organized into 8 groups according to their nutritional characteristics; a closed section with 9 categories of frequency of consumption raging from "never/ less than once per month" to "six/ more times per day"; and a section with predefined standard portions. The questionnaire also includes an open section for the inclusion of other food not listed and consumed with a frequency of one to three times per month. In order to estimate the dietary intake, reported frequency for each item was multiplied by its standard portion in grams (g), and by a factor of seasonal variation for food ingested at specific times. The conversion of food into nutrients was made using the computer software Food Processor Plus® (ESHA Research, Salem, Oregon), with nutritional information from food composition tables of the US Department of Agriculture. The nutritional content of typical Portuguese food were added to the original database using data from the Portuguese Food Composition Table and other studies that evaluated Portuguese food composition, as previously described in detail (Lopes, 2000; Lopes et al., 2007). This questionnaire presented reproducibility and validity similar to those described in other populations, ensuring its applicability and suitability to assess the dietary intake in studies involving large samples of Portuguese individuals (Lopes, 2000; Lopes et al., 2007; Moreira et al., 2003).

The *Paffenbarger Physical Activity Questionnaire* includes three major components: stairs climbed, walking, and participation in sports and recreational physical activity. Subjects reported how many flights of stairs they climbed on a daily average, how many blocks they walked on average each day, and listed any sports or recreational activities in which they participated during the previous week, indicating its frequency and duration (Paffenbarger et al., 1978; Pereira et al., 1997). The overall validity and reliability of this instrument is well established (Ainsworth et al., 1993; Jacobs et al., 1993).

Participants were asked to wear an *accelerometer* (Actigraph AM256) during all waking hours (with the exception of bathing and water activities) for a period of seven complete and consecutive days. This device, which was designed for assessing human movement in terms of acceleration, can capture intensity, frequency, and duration of

movement over a period of several days (minute-by-minute measurements) in free-living subjects, and can distinguish moderate-plus-vigorous physical activity from less-intense physical activity (Mathie et al., 2004).

References

Ainsworth, B.E., Leon, A.S., Richardson, M.T., Jacobs, D.R., Paffenbarger, R.S. Jr., 1993. Accuracy of the College Alumnus Physical Activity Questionnaire. *Journal of Clinical Epidemiology 46*(12), 1403-1411.

Jacobs, D.R. Jr., Ainsworth, B.E., Hartman, T.J., Leon, A.S., 1993. A simultaneous evaluation of 10 commonly used physical activity questionnaires. *Medicine and Science in Sports and Exercise 25*(1), 81-91.

Lopes, C., 2000. *Reprodutibilidade e validação de um questionário semi-quantitativo de frequência alimentar. In: Alimentação e enfarte agudo do miocárdio: um estudo caso-controlo de base populacional*. Universidade do Porto, Porto, pp. 79-115.

Lopes, C., Aro, A., Azevedo, A., Ramos, E., Barros, H., 2007. Intake and adipose tissue composition of fatty acids and risk of myocardial infarction in a male Portuguese community sample. *Journal of the American Dietetics Association, 107*(2), 276-286.

Mathie, M.J., Coster, A.C., Lovell, N.H., Celler, B.G., 2004. Accelerometry: providing an integrated, practical method for long-term, ambulatory monitoring of human movement. *Physiological Measurement, 25*, R1-20.

Moreira, P., Sampaio, D., Almeida, M.D.V., 2003. [Validity assessment of a food frequency questionnaire by comparison with a 4-day diet record]. *Acta Médica Portuguesa, 16*(6)**,** 412-420.

Paffenbarger, R.S. Jr., Wing, A.L., Hyde, R.T., 1978. Physical activity as an index of heart attack risk in college alumni. *American Journal of Epidemiology, 108*(3), 161-175.

Pereira, M.A., FitzerGerald, S.J., Gregg, E.W., Joswiak, M.L., Ryan, W.J., Suminski, R.R., Utler, A.C., Zmuda, J.M., 1997. A collection of physical activity questionnaires for health-related research: Paffenbarger Physical Activity Questionnaire. *Medicine and Science in Sports and Exercise 29*, 83-88.

CHAPTER 5

Predicting Long-Term Weight Loss Maintenance in Previously Overweight Women: A Signal Detection Approach (Study IV)[6]

[6] **Santos I**, Mata, J, Silva, MN, Sardinha LB, Teixeira PJ. (2015). Predicting long-term weight loss maintenance in previously overweight women: A signal detection approach. Obesity, 23(5):957-964. doi: 10.1002/oby.21082 (IF: 3.734)

Abstract

Objective: Examine psychological and behavioral predictors of 3-year weight loss maintenance in women.

Design and Methods: Participants were 154 women in a 1-year randomized controlled trial on weight management with a 2-year follow-up. Signal detection analyses identified behavioral and psychological variables that best predicted 5% and 10% weight loss at 3 years.

Results: Women with better body image were more likely to have lost ≥5% weight at 3 years ($p<0.001$). Exercise intrinsic motivation had a partial compensatory effect, in that women with poorer body image but higher motivation were more likely to maintain weight loss than women with poor body image and lower motivation ($p<0.001$). Women with high exercise autonomous motivation were three times more likely to have lost ≥10% weight than were those with lower autonomous motivation ($p<0.001$). Among women with lower autonomous motivation, perceiving fewer exercise barriers was somewhat compensatory: these women were more likely to maintain weight loss than women with lower autonomy but more perceived barriers ($p<0.01$).

Conclusions: In overweight women, improving body image and increasing autonomous and intrinsic motivation for exercise likely promotes clinically significant long-term weight loss maintenance. Decreasing perceived exercise barriers is another promising intervention target.

Introduction

Long-term weight loss maintenance is a major challenge. Success rates of individuals who are overweight and try to maintain long-term weight loss are 20% at most (1). Typically, one-third of weight lost is regained within 1 year and the other two-thirds within 3-5 years (2). Identifying behavioral and psychological predictors of successful long-term weight loss maintenance is therefore essential to make obesity interventions more effective.

A review of psychosocial pre-treatment predictors of long-term weight control identified few previous weight loss attempts and an autonomous, self-motivated regulatory style as the best prospective predictors (3). Evidence for other variables, such as positive body image, eating self-efficacy, or few perceived barriers to exercise, was mixed or weak. A broader, conceptual review identified a large set of putative predictors of weight loss maintenance (4), including a physically active lifestyle and high social support (i.e., perceived emotional and practical support from significant others), self-efficacy (i.e., the belief in one's ability to maintain weight loss), and autonomy (be causal agent of one's actions). A recent systematic review of self-regulation mediators of weight control suggested that the most consistent predictors of long-term weight change are exercise autonomous motivation (a concept that includes both intrinsic and meaningful extrinsic motives, such as improving health), exercise self-efficacy, low perceived barriers to exercise, flexible eating restraint (i.e., conscious attempts to monitor and regulate food intake in a flexible way), positive body image, and self-regulation skill use (e.g., self-monitoring, planning, goal-setting) (5).

Although these reviews provide insights critical for understanding the role of behavioral and psychological factors in long-term weight management, the quality and nature of the predictors assessed was very heterogeneous, meaning that any conclusions drawn must be tentative. Moreover, there is a dearth of studies systematically examining a wide range of behavioral and psychological predictors of long-term weight loss beyond 12 months. This study contributes to filling this gap by examining psychological and behavioral predictors of 3-year weight loss maintenance in overweight women involved in a lifestyle weight management intervention. We conducted an exploratory data analysis of a large set of behavioral and psychological predictors of weight loss maintenance to create a hierarchy of predictors/profiles of successful weight maintenance. Importantly, the

predictors examined were selected on the basis of theoretical considerations and systematic empirical reviews of long-term weight maintenance.

Methods

Study design

The data presented here are from the longitudinal randomized controlled trial "Promotion of Exercise and Health in Obesity" (PESO; see Ref. (6) for a detailed description). Briefly, PESO consisted of a 1-year behavioral weight management intervention and an additional 2-year follow-up period. The aim was to promote long-term weight control by increasing participants' autonomous motivation toward exercise and eating. The intervention was based on principles from self-determination theory and aimed at encouraging participants to increase their physical activity and energy expenditure and adopt a moderately restricted diet (6). The control group received a general health education curriculum, comparable in duration and intensity to the treatment of the intervention group. The Institutional Review Board of the Faculty of Human Kinetics, Technical University of Lisbon, approved the study.

Participants

Participants were women recruited from the community at large; they gave written consent for participation. The sample was restricted to women (a) to obtain a more homogeneous sample and (b) because women have a higher risk of weight gain and particularly high rates of obesity (7).

Participants fulfilled the following inclusion criteria: female, between 25 and 50 years old, premenopausal, body mass index (BMI) between 25 and 40 kg/m^2, willing to attend weekly meetings for one year, free from major illnesses, not taking medication known to interfere with body weight. A total of 258 women completed the initial assessments. Of those, 13 started taking medication potentially affecting body weight, 4 were diagnosed with severe illness or injury, 11 became pregnant, and 9 entered menopause. The data from these 37 women were excluded from analyses, leaving 221 eligible baseline participants. A total of 156 women completed the 3-year follow-up assessments (71% overall retention). For the analyses reported here, 2 women without anthropometric data at 3-year follow-up were excluded, leaving a final sample of 154

women. Women who completed the 3-year assessments did not differ from those who quit the program in terms of demographic or baseline psychological variables except for age: women who dropped out were on average three years younger (see Ref. (8) for a detailed description of dropouts).

Measurements

After the 1-year intervention, participants completed a comprehensive, theoretically motivated battery of psychometric instruments (9). If validated Portuguese versions of the instruments were not available, instruments were translated and back-translated from English to Portuguese; congruence with the factor solutions of the original questionnaires were verified by factor analyses (data not shown). Higher scores always represent higher manifestations of the psychometric variables. Cronbach's α was calculated to assess internal consistency for each (sub-)scale that was included in the analyses.

General and exercise motivation. General self-determination was assessed using the self-determination scale (10): statements forming two subscales describe individual differences in self-determined functioning (awareness of self subscale, α = 0.68; perceived choice subscale, α = 0.82). Different types of exercise motivation were measured with the exercise self-regulation questionnaire (11), which comprises two major subscales: controlled (α = 0.56) versus autonomous (α = 0.86) exercise motivation. Dimensions of intrinsic motivation for exercise (enjoyment, competence, importance, absence of pressure toward exercise) were further explored using the intrinsic motivation inventory ((12)); α = 0.94). The exercise motives inventory–2 (13) assessed intrinsic (α = 0.79) and extrinsic exercise goals (α = 0.51). Beliefs in being able to adhere to an exercise program for at least 6 months under varying circumstances were evaluated using the self-efficacy for exercise behaviors scale ((14); α = 0.90). Perceived barriers to exercise in terms of time, effort, and obstacles were assessed with the exercise perceived barriers scale ((15); α = 0.85).

Psychological well-being and quality of life. The discrepancy between perceived self and ideal body size, an evaluative component of body image, was measured with the figure rating scale (16), composed of nine silhouettes of increasing body size. The difference between respondents' perceived current body size and indicated ideal body size represents the discrepancy. Body shape concerns in terms of a dysfunctional investment in appearance were evaluated with the body shape questionnaire ((17); α = 0.95). Self-esteem was assessed with the Rosenberg self-concept/self-esteem scale ((18); α = 0.88). The physical self-perception profile questionnaire (19) assessed self-esteem in several

dimensions of the physical domain, including global physical self-worth (α = 0.88) and body attractiveness (α = 0.82). The social support for exercise survey (20) gauged the level of support that individuals who exercised felt they received from family and friends (α = 0.90). Cognitive, affective, and somatic symptoms of depression were measured with the Beck depression inventory ((21); α = 0.91). The short-form health survey (22) measured physical (α = 0.71) and psychological (α = 0.75) health-related quality of life. Weight-related quality of life was assessed using the impact of weight on quality of life-lite ((23); α = 0.93).

Eating behavior and eating habits. The three-factor eating questionnaire (24, 25) assessed flexible cognitive restraint (α = 0.63), rigid cognitive restraint (α = 0.62), eating disinhibition (α = 0.74), and perceived hunger (α = 0.76). Energy, fat and fiber intake were evaluated using a semi-quantitative food-frequency questionnaire (26) covering the 12 preceding months. Dietary intake was calculated by multiplying the consumption frequency of each of 86 food items with its standard portion in grams (g) and by a seasonal variation factor for food ingested at specific times. Food information was converted into nutrients with the software Food Processor Plus® (ESHA Research, Salem, Oregon).

Physical activity. Duration of moderate plus vigorous physical activity (≥ 3 metabolic equivalents or METs) per week was estimated with the 7-day physical activity recall scale (27). Lifestyle physical activity was assessed using the lifestyle physical activity index (9). This self-administered instrument measures habitual lifestyle physical activities typical of the last month (α = 0.83).

Body weight. Body weight was measured twice, with an electronic scale calibrated onsite and accurate to 0.1 kg (SECA, Hamburg, Germany), in the morning, after participants had fasted for 3h. Weight was expressed as percent weight change from baseline to the end of the study (after 3 years total).

Statistical Analyses

Intervention and control groups were collapsed for the analyses; 1-year (post-treatment) data was used to predict 3-year outcomes. This approach was taken because (a) all women in the study intended to lose weight; (b) women in both groups had a comparable amount of contact with health professionals; (c) collapsing the two groups led to a greater variability in behavioral and psychological aspects, and our objective was to identify universal predictors of long-term weight management.

Descriptive analyses were conducted using the IBM Statistical Package for the Social Sciences, version 22. The significance level for analyses was set at $p < 0.05$. Pearson correlations with Bonferroni's corrections were used to examine associations between the predictor variables and weight change at the end of the follow-up period.

To systematically identify subgroups of individuals who were homogeneous with respect to outcome and predictor variables (28, 29), we conducted signal detection analyses using Signal Detection Software for Receiver Operator Characteristics (ROC) (30). This recursive partitioning method is especially useful in exploratory analyses that are likely to involve multicollinearity and interactions between predictors and for generating strong hypotheses to be tested in subsequent validation samples or future tailored interventions (28, 29). The signal detection analysis proceeds in a forward iterative fashion and uses chi-square tests to divide the sample into two mutually exclusive and maximally discriminated subsamples. This empirical process is repeated systematically within each subsample and continues until the number of subjects falls below a specified level or until the most efficient cut-off is no longer significant.

The present signal detection analyses identified characteristics that best predicted 3%, 5%, and 10% weight loss at the end of the follow-up (3-year measurement). Three dichotomous outcome variables (signals) were created: (a) yes/no $\geq$ 3% weight loss; (b) yes/no $\geq$ 5% weight loss; (c) yes/no $\geq$ 10% weight loss, all from baseline to 3-year measurement. A set of 28 predictor variables was examined. All predictors were continuous variables and were simultaneously entered into the analysis. Additionally, belonging to the intervention versus control group was included as nominal predictor variable to test whether the relation between predictors and outcome was confounded by the intervention effect. The significance level for split subsamples was $p < 0.05$; the minimum number of cases within each subgroup was set at 10 and the number of iterations set at 100.

To compare the psychological and behavioral profiles of the most and least successful subgroups emerging from signal detection analysis, we used independent-samples *t* tests, corrected for multiple testing using the Bonferroni's procedure. The desired significance level, < 0.05, was divided by the number of tests (n=26 for t-tests; n=28 for Pearson's correlations), resulting in an adjusted value of $p < 0.0019$ for difference ($p<0.0018$ for associations).

Results

Sample characteristics and descriptive results

Women who completed the 3-year assessment had a mean age of 38.7 years (SD = 6.6) and a mean BMI of 29.8 kg/m^2 (SD = 4.2) at the end of the intervention. The main effects of the intervention and follow-up are described in detail elsewhere (8, 31). In brief, at the end of the follow-up (3-year measurement), average weight loss was higher in the intervention group (–3.06 ± 6.1 kg) than in the control group (–1.00 ± 5.8 kg), as was improvement in many of the psychological and behavioral targets (8).

Table 1 shows the descriptive statistics and bivariate correlations of motivational, psychological, eating-related behavior, and physical activity variables with weight change at the end of the follow-up. Numerous predictor variables were highly correlated in the expected direction with weight change at the 3-year measurement.

Signal detection analyses to identify successful subgroups

The tree diagrams in Figures 1 and 2 display the most successful versus least successful subgroups identified by means of signal detection analysis. Results for the 3% weight loss outcome were identical to those for the 5% outcome. Given that achieving a 5% weight loss can be assumed to produce clinically more meaningful health benefits (32), we report only these results.

Figure 1 shows the hierarchy of predictors of at least 5% weight loss at the 3-year measurement. A total of 34% (n = 52) of participating women achieved the ≥ 5% weight loss criterion. Self–ideal body size discrepancy emerged as the predictor variable that best differentiated between the high and low success subgroups ($X^2 = 14.8$, $p < 0.001$): Of those with a low self–ideal body size discrepancy (i.e., a more positive body image), 54% (n = 29) met the success criterion. In contrast, only 23% (n = 23) of those with a high self–ideal body size discrepancy (≥ 2) achieved ≥ 5% weight loss after 3 years.

No additional predictor further differentiated women in the most successful group. The subgroup of participants with a high self–ideal body size discrepancy was further divided into those with lower versus higher exercise intrinsic motivation ($X^2 = 12.5$, $p < 0.001$): Those with high exercise intrinsic motivation (≥ 64) were significantly more likely to achieve ≥ 5% weight loss at 3 years (41%; n = 17) than those with low exercise intrinsic motivation (10%; n = 6). Thus, high exercise intrinsic motivation proved somewhat

Table 1. Descriptive statistics and bivariate correlations between study variables at 1-year assessment and weight change at 3-year follow-up

	M ± SD	[Min; Max]	Weight change at 3y[a]
General and exercise motivation			
Awareness of self	20.1 ± 3.52	[7; 25]	–0.26
Perceived choice	17.2 ± 4.23	[5; 25]	–0.16
Exercise controlled motivation	18.2 ± 6.40	[8; 40]	0.09
Exercise autonomous motivation	46.4 ± 9.07	[8; 56]	–0.24
Exercise intrinsic motivation	60.7 ± 11.5	[23; 80]	**–0.31**
Intrinsic exercise goals	11.8 ± 2.44	[4; 17]	**–0.29**
Extrinsic exercise goals	5.70 ± 3.32	[0; 18]	0.02
Exercise self-efficacy	38.6 ± 6.73	[19; 50]	**–0.32**
Perceived barriers to exercise	27.7 ± 8.18	[11; 55]	**0.33**
Psychological well-being and quality of life			
Self–ideal body size discrepancy	1.72 ± 0.78	[0; 4]	**0.38**
Body shape concerns	76.3 ± 23.4	[36; 146]	0.24
Self-esteem	34.2 ± 4.49	[18; 40]	–0.16
Physical self-worth	13.8 ± 3.63	[6; 24]	**–0.28**
Body attractiveness	12.8 ± 3.27	[6; 24]	–0.24
Exercise social support	21.6 ± 8.02	[9; 45]	–0.19
Depressive symptoms	5.67 ± 6.62	[0; 41]	0.21
Physical health-related quality of life	84.4 ± 13.6	[27; 100]	–0.26
Mental health-related quality of life	71.4 ± 18.3	[20; 99]	–0.15
Impact of weight on quality of life	48.4 ± 14.5	[31; 109]	**0.35**
Eating behavior and eating habits			
Flexible restraint	5.49 ± 1.54	[0; 7]	–0.28
Rigid restraint	4.52 ± 1.73	[0; 7]	–0.12
Disinhibition	7.33 ± 3.48	[1; 15]	0.21
Hunger	4.61 ± 3.14	[0; 13]	0.16
Energy intake (kcal/day)	2190 ± 882.4	[681; 6346]	0.05
Fat intake (% kcal/day)	32.3 ± 6.48	[16.8; 55.8]	0.08
Fiber intake (g/day)	32.8 ± 19.1	[5.5; 144.8]	0.00
Physical activity			
Moderate-to-vigorous physical activity (min/week)	254.9 ± 192.6	[0; 870]	**–0.33**
Lifestyle physical activity	3.46 ± 0.84	[1; 5]	–0.17

Note. Scales range: Awareness of self and perceived choice [5-25]; exercise controlled and autonomous motivation [8-56]; exercise intrinsic motivation [16-80]; intrinsic exercise goals [0-17]; extrinsic exercise goals [0-18]; exercise self-efficacy [10-50]; perceived barriers to exercise [11-55]; self-ideal body size discrepancy [-8-8]; body shape concerns [34-204]; self-esteem [10-40]; physical self-worth and body attractiveness [6-24]; exercise social support [9-45]; depressive symptoms [0-63]; physical and mental health-related quality of life [0-100]; impact of weight on quality of life [31-155]; flexible and rigid restraint [0-7]; disinhibition [0-16]; hunger [0-14]; lifestyle physical activity [1-5].

[a]Pearson's correlations. Statistically significant differences are represented in bold type [significance level is Bonferroni corrected (p<0.0018)].

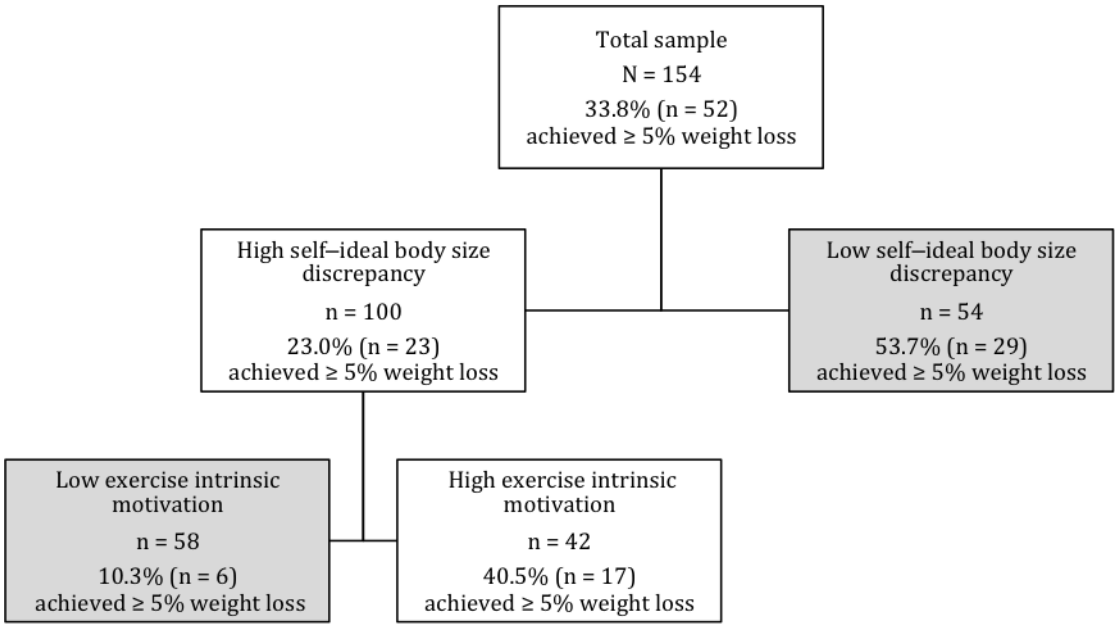


Figure 1. Hierarchy of predictors of ≥ 5% weight loss at the 3-year measurement.
The most (women with low self–ideal body size discrepancy) and least successful subgroups (women with high self–ideal body size discrepancy and low exercise intrinsic motivation) are shaded in gray.

compensatory for women with a high self–ideal body size discrepancy in terms of achieving ≥ 5% weight loss after 3 years.

Table 2 summarizes the psychological and behavioral profiles of the most and least successful subgroups identified in Figure 1. The most successful subgroup (i.e., women with low self–ideal body size discrepancy) showed a more positive profile concerning the psychological and behavioral predictor variables than the least successful subgroup.

Figure 2 shows the hierarchy of predictors of at least 10% weight loss at 3 years. Of the full sample of 154 women, 27 (18%) achieved 10% or more weight loss at the 3-year measurement. Exercise autonomous motivation was identified as the most powerful predictor ($X^2 = 13.2$, $p < 0.001$): Women with high exercise autonomous motivation (≥ 54) more often succeeded in achieving at least 10% weight loss (36%; n = 15) than did those reporting low exercise autonomous motivation (11%; n = 12).

Table 2. Psychological and behavioral profiles of the most and least successful subgroups emerging from the decision tree for ≥ 5% weight loss

Variables	Low self–ideal body size discrepancy (< 2) (n = 54, 53.7% achieved ≥ 5% weight loss)	High self–ideal body size discrepancy (≥ 2) & low exercise intrinsic motivation (< 64) (n = 58, 10.3% achieved ≥ 5% weight loss)	*p*
General and exercise motivation			
Awareness of self	20.4 ± 3.64	19.5 ± 3.25	0.180
Perceived choice	16.7 ± 4.60	16.4 ± 3.72	0.680
Exercise controlled motivation	19.0 ± 7.03	18.1 ± 5.99	0.472
Exercise autonomous motivation	47.7 ± 8.12	41.5 ± 9.96	**<0.001**
Exercise intrinsic motivation	62.6 ± 11.7	53.1 ± 9.13	-
Intrinsic exercise goals	12.0 ± 2.44	10.7 ± 2.29	0.005
Extrinsic exercise goals	5.83 ± 2.98	6.23 ± 3.08	0.492
Exercise self-efficacy	39.6 ± 6.27	35.4 ± 6.81	**0.001**
Perceived barriers to exercise	25.5 ± 7.40	32.8 ± 7.33	**<0.001**
Psychological well-being and quality of life			
Self-ideal body size discrepancy	0.89 ± 0.32	2.29 ± 0.53	-
Body shape concerns	70.3 ± 22.6	85.2 ± 22.7	**0.001**
Self-esteem	34.5 ± 4.57	33.2 ± 4.69	0.134
Physical self-worth	14.6 ± 3.94	12.2 ± 2.82	**<0.001**
Body attractiveness	13.7 ± 3.61	11.4 ± 2.60	**<0.001**
Exercise social support	22.2 ± 7.39	19.9 ± 7.88	0.117
Depressive symptoms	4.56 ± 5.41	6.91 ± 7.35	0.057

Physical health-related quality of life	89.9 ± 8.55	77.7 ± 15.9	**<0.001**
Mental health-related quality of life	74.2 ± 18.0	65.4 ± 18.7	0.013
Impact of weight on quality of life	41.5 ± 9.81	57.0 ± 15.9	**<0.001**
Eating behavior and eating habits			
Flexible restraint	6.06 ± 1.01	4.91 ± 1.76	**<0.001**
Rigid restraint	5.21 ± 1.29	3.84 ± 1.69	**<0.001**
Disinhibition	6.70 ± 3.23	8.43 ± 3.48	0.008
Hunger	4.40 ± 2.72	5.21 ± 3.53	0.181
Energy intake (kcal)	2235 ± 1079	2136 ± 712.0	0.582
Fat intake (% kcal)	31.8 ± 6.31	34.1 ± 6.83	0.077
Fiber intake (g)	33.7 ± 19.0	29.5 ± 15.1	0.219
Physical activity			
Moderate-to-vigorous physical activity (min/wk)	285.8 ± 169.0	187.8 ± 192.9	0.006
Lifestyle physical activity	3.55 ± 0.86	3.29 ± 0.86	0.138

Note. Values expressed as mean ± SD.

Statistically significant differences resulting from independent-samples *t* test are represented in bold type [significance level is Bonferroni corrected (p<0.0019)].

Again, no additional predictor differentiated participants in the most successful group. However, among women with low exercise autonomous motivation, the next best variable to differentiate the sample was perceived barriers to exercise ($X^2 = 7.3$, $p < 0.01$). Participants with low perceived barriers to exercise (< 27) were more likely to succeed (22%; n = 8) than those with high perceived barriers (5%; n = 4).

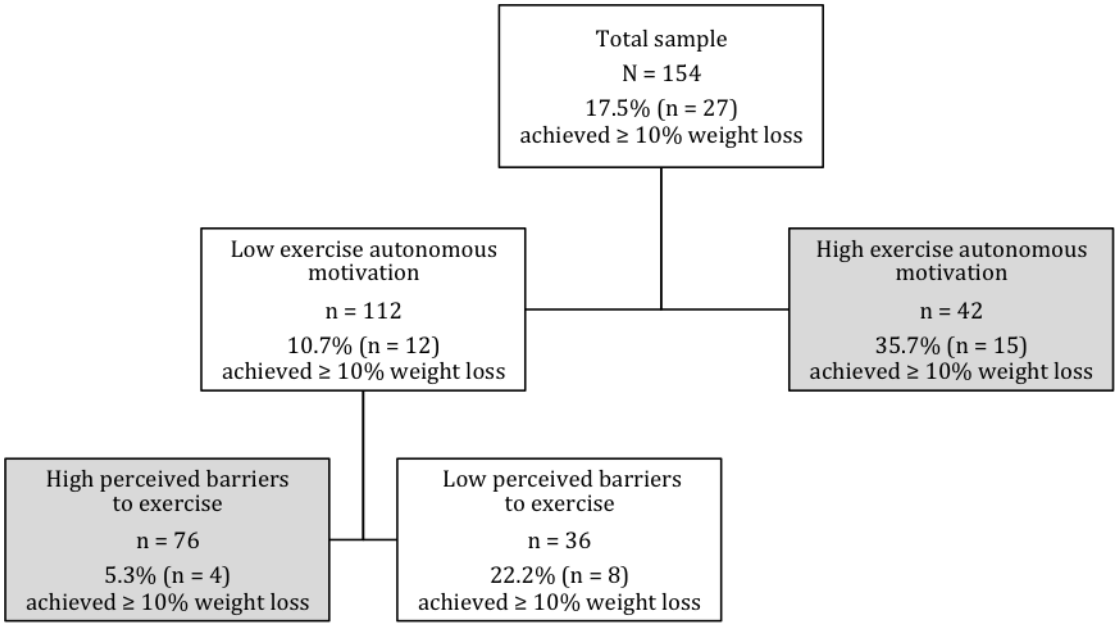


Figure 2. Hierarchy of predictors of ≥ 10% weight loss at the 3-year measurement.
The most (women with high exercise autonomous motivation) and least successful subgroups (women with high exercise autonomous motivation and high perceived barriers to exercise) are shaded in gray.

The psychological and behavioral profiles of the most and least successful subgroups as shown in Figure 2 are described in Table 3. The most successful subgroup showed a more positive profile concerning psychological and behavioral variables, similar to the most successful group at the 5% criterion. In addition, significant differences in physical activity patterns were observed, in favor of the most successful subgroup. In contrast, the least successful subgroup showed poorer body image and higher impact of weight on quality of life.

Table 3. Psychological and behavioral profiles of the most and least successful subgroups emerging from the decision tree for ≥ 10% weight loss

Variables	High exercise autonomous motivation (≥ 54) (N = 42, 35.7% achieved ≥ 10% weight loss)	Low exercise autonomous motivation (< 54) & high perceived barriers to exercise (≥ 27) (N = 76, 5.3% achieved ≥ 10% weight loss)	*p*
General and exercise motivation			
Awareness of self	21.9 ± 2.79	19.1 ± 3.52	**<0.001**
Perceived choice	19.6 ± 3.98	15.9 ± 4.02	**<0.001**
Exercise controlled motivation	18.6 ± 6.50	19.3 ± 6.10	0.588
Exercise autonomous motivation	55.2 ± 0.90	41.7 ± 9.44	-
Exercise intrinsic motivation	69.7 ± 7.33	54.2 ± 10.9	**<0.001**
Intrinsic exercise goals	13.8 ± 1.83	10.8 ± 2.41	**<0.001**
Extrinsic exercise goals	5.75 ± 3.97	6.18 ± 3.14	0.558
Exercise self-efficacy	43.2 ± 4.97	34.9 ± 6.60	**<0.001**
Perceived barriers to exercise	22.0 ± 6.13	33.9 ± 5.54	-
Psychological well-being and quality of life			
Self-ideal body size discrepancy	1.56 ± 0.79	1.96 ± 0.76	0.013
Body shape concerns	68.5 ± 20.8	84.8 ± 23.4	**<0.001**
Self-esteem	35.7 ± 3.95	33.3 ± 4.59	0.005
Physical self-worth	16.2 ± 3.64	12.3 ± 2.99	**<0.001**
Body attractiveness	14.4 ± 3.77	11.5 ± 2.67	**<0.001**
Exercise social support	22.8 ± 8.44	20.8 ± 7.53	0.200
Depressive symptoms	4.35 ± 5.88	6.68 ± 7.26	0.067

Physical health-related quality of life	90.6 ± 7.80	79.7 ± 14.9	**<0.001**
Mental health-related quality of life	78.1 ± 16.8	66.9 ± 18.6	**0.001**
Impact of weight on quality of life	42.8 ± 12.5	53.9 ± 15.0	**<0.001**
Eating behavior and eating habits			
Flexible restraint	6.05 ± 0.97	5.09 ± 1.74	0.002
Rigid restraint	5.02 ± 1.49	4.09 ± 1.80	0.004
Disinhibition	6.68 ± 3.86	8.16 ± 3.30	0.042
Hunger	4.27 ± 2.67	5.24 ± 3.58	0.131
Energy intake (kcal)	2373 ± 1087	2179 ± 834.4	0.331
Fat intake (% kcal)	30.8 ± 6.46	33.4 ± 6.45	0.045
Fiber intake (g)	39.5 ± 25.1	31.1 ± 16.7	0.038
Physical activity			
Moderate-to-vigorous physical activity (min/wk)	319.5 ± 192.5	191.8 ± 182.4	**0.001**
Lifestyle physical activity	3.90 ± 0.81	3.14 ± 0.77	**<0.001**

Note. Values expressed as mean ± SD

Statistical significance differences resulting from independent-samples *t-test* are represented in bold type [significance level is Bonferroni corrected (p<0.0019)].

Discussion

This study sought to identify effective psychological and behavioral predictors of 3-year weight loss maintenance. Three clinically meaningful magnitudes of weight loss were examined: 3%, 5%, and 10%. Results for 3% and 5% weight loss after 3 years were identical: Women with a more positive body image after the 1-year intervention were most likely to achieve at least 3% or 5% weight loss. In addition, high intrinsic motivation for exercise buffered the effect of poor body image: Women with poor body image who showed high intrinsic motivation for exercise were the group second most likely to achieve 3% or 5% weight loss over time. Among women who had achieved 10% or more weight loss, high exercise autonomous motivation at the end of the 1-year intervention was the strongest predictor of 3-year weight loss maintenance.

To our knowledge, this is the first study applying signal detection methods to identify behavioral and psychological characteristics associated with long-term weight loss maintenance in women participating in a lifestyle weight management intervention. The signal detection method allowed us to compare the importance of different behavioral and psychological factors for long-term weight loss maintenance, and to explore interacting effects between those factors.

Variables related to both motivational and psychological well-being emerged as the most efficient predictors of 3-year weight loss maintenance. These results are consistent with a recent systematic review on self-regulation mediators of weight control, which identified positive body image and autonomous motivation among the key predictors of successful weight outcomes (5). Among people seeking treatment, poor body image predicted poorer weight outcomes and increased the chance of relapse (33), while positive changes in body image during treatment predicted long-term weight loss maintenance (31).

Increases in exercise intrinsic motivation during treatment (i.e., increases in the experience of enjoyment, genuine interest, and/or feeling positively challenged) partially explain the long-term effects of weight control interventions (34). Experiencing exercise as positive and meaningful rather than solely as a means to control weight increases successful long-term exercise adherence (35). Further, intrinsic exercise motivation may also improve the motivation of other weight-related behaviors: Mata et al. found that exercise intrinsic motivation was associated with improved eating regulation during weight management (36).

Importantly, among women with low exercise autonomous motivation having low perceived exercise barriers played a somewhat compensatory role. This finding underlines that successful weight loss maintenance depends on a number of factors. If a powerful aspect such as autonomous motivation is absent, it can be partially compensated for by other factors. For example, having low perceived exercise barriers (e.g., easy access to exercise facilities) may help individuals to regulate weight control behaviors, even when the quality of their motivation is less favorable. In sum, the present results support and extend previous findings by identifying body image and autonomous motivation as two promising targets for successful long-term weight management and pointing to additional candidate targets, such as reducing perceived barriers to exercise.

The present findings also highlight differences in the psychological and behavioral profiles of women who successfully lost weight in the long term versus those who did not. The most successful subgroups — women with a more positive body image and women with high exercise autonomous regulation — also showed higher psychological well-being, quality of life, and a more adaptive motivational profile (e.g., higher perceived choice and self-efficacy). This result is in line with previous findings that a more positive body image facilitates making healthy rather than appearance-based decisions, eventually promoting long-term weight management (31). The present findings also speak to the importance of autonomous motivation in increasing quality of life, psychological well-being (37), physical activity (35), and healthful eating behaviors (38).

In sum, our findings of distinct psychological and behavioral profiles in women who successfully maintain weight loss highlight the importance of targeting body image and motivation quality as potential precursors of physical activity and eating regulation in weight management interventions. Targeting psychological factors underlying behavior, rather than attempting to directly influence behaviors, may be most successful. In fact, a recent study showed that a motivation-focused weight maintenance program offers an effective alternative approach to traditional skill-based programs for long-term weight control (39). Also, the results of this signal detection analysis suggest that achieving more weight loss (10% or more) is – motivationally and cognitively – not simply a linear continuation of less weight loss (at least 5% or more), but may have qualitatively different underlying motivational and cognitive predictors. Importantly, however, exercise motivation was also one of the most important predictors for achieving lower weight loss, underlying its importance in the process.

Important limitations of this study include the homogeneous sample of previously overweight adult women, which may preclude generalization to other populations. Also, smoking habits, known to be related to weight control, should be assessed in future studies. Further, we used self-report measures to assess physical activity. However, the instruments used are valid and reliable measures, and such self-report measures are known to correlate with other behavioral assessments [e.g., based on accelerometry (40)].

The present study used signal detection methods for an exploratory, hypothesis-generating analysis. Alongside with its statistical advantages, this method allowed to determine significant predictors in a hierarchical fashion, creating *profiles of success.* Furthermore, we identified cut-off points for the significant predictors. To our knowledge, the current study is the first to provide cut-off values of significant determinants of successful long-term weight loss maintenance (or lack thereof), which are of particular clinical relevance. For example, if exercise autonomous motivation is equal or higher than 54 points, the probability of maintaining 10% or more weight loss is significantly higher. While confirmatory evidence is needed, the present study is a step forward towards identifying groups with the most and the least successful profiles for long-term weight loss maintenance on the basis of their psychological and behavioral characteristics during treatment.

Acknowledgments

The authors are grateful to Susannah Goss for her help in editing and proofreading the manuscript, and to Paulo Vieira for his collaboration involving the use of signal detection methodology.

Funding agencies

This study was funded by grants from the Portuguese Science and Technology Foundation (FCT-POCI/DES/57705/2004 and SFRH/BD/80739/2011 to the first author) and the Calouste Gulbenkian Foundation (grant number 65565/2004). The authors are grateful to the Oeiras City Council and Nestlé Portugal for their additional financial support.

References

1. Wing RR, Phelan S. Long-term weight loss maintenance. *Am J Clin Nutr* 2005;82:222S-225S.
2. Powell LH, Calvin JE. Effective obesity treatments. *Am Psychol* 2007;62:234-246.
3. Teixeira PJ, Going SB, Sardinha LB, Lohman TG. A review of psychosocial pre-treatment predictors of weight control. *Obes Rev* 2005;6:43-65.
4. Elfhag K, Rossner S. Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obes Rev* 2005;6:67-85.
5. Teixeira PJ, Carraça EV, Marques MM, Rutter H, Oppert JM, De Bourdeaudhuij I, et al. A systematic review of self-regulation mediators of success in obesity interventions: The SPOTLIGHT project. *BMC Medicine* (in press).
6. Silva MN, Markland D, Minderico CS, Vieira PN, Castro MM, Coutinho SR, et al. A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight control: rationale and intervention description. *BMC Public Health* 2008;8:234-247.
7. Williams L, Germov J, Young A. Preventing weight gain: a population cohort study of the nature and effectiveness of mid-age women's weight control practices. *Int J Obes* 2007;31:978-986.
8. Silva MN, Markland D, Carraca EV, Vieira PN, Coutinho SR, Minderico CS, et al. Exercise autonomous motivation predicts 3-yr weight loss in women. *Med Science Sports Exerc* 2011;43:728-737.
9. Silva MN, Vieira PN, Coutinho SR, Minderico CS, Matos MG, Sardinha LB, et al. Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. *J Behav Med* 2010;33:110-122.
10. Sheldon K, Ryan R, Reis H. What makes for a good day? Competence and autonomy in the day and in the person. *Pers Soc Psychol B* 1996;22:1270-1279.
11. Ryan RM, Connell JP. Perceived locus of causality and internalization: examining reasons for acting in two domains. *J Pers Soc Psychol* 1989;57:749-761.
12. McAuley E, Duncan T, Tammen VV. Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: a confirmatory factor analysis. *Res Q Exerc Sport* 1989;60:48-58.

13. Markland D, Ingledew D. The measurement of exercise motives: factorial validity and invariance across gender of a revised exercise motivation inventory. *Brit J Health Psychol* 1997;2:361-376.
14. Sallis JF, Pinski RB, Grossman RM, Patterson TL, Nader PR. The development of self-efficacy scales for healthrelated diet and exercise behaviors. *Health Educ Res* 1988;3:283-292.
15. Steinhardt MA, Dishman RK. Reliability and validity of expected outcomes and barriers for habitual physical activity. *J Occup Med* 1989;31:536-546.
16. Stunkard AJ, Sorensen T, Schulsinger F. Use of Danish Adoption Register for the study of obesity and thinness. *Res Publ Assoc Res Nerv Ment Dis* 1983;60:115-120.
17. Rosen JC, Jones A, Ramirez E, Waxman S. Body Shape Questionnaire: studies of validity and reliability. *Int J Eat Disord* 1996;20:315-319.
18. Rosenberg M. *Society and the adolescent self-image*. Princeton University Press: Princeton, NJ; 1965.
19. Fox KR, Corbin CB. The physical self-perception profile: development and preliminary validation. *J Sport Exerc Psychol* 1989;11:408-430.
20. Sallis JF, Grossman RM, Pinski RB, Patterson TL, Nader PR. The development of scales to measure social support for diet and exercise behaviors. *Prev Med* 1987;16:825-836.
21. Beck AT, Steer RA. *Manual for the Beck depression inventory*. Psychological Corporation: New York; 1987.
22. Ferreira PL. [Development of the Portuguese version of MOS SF-36. Part II -- Validation tests]. *Acta Med Port* 2000;13:119-127.
23. Engel SG, Kolotkin RL, Teixeira PJ, Sardinha LB, Vieira PN, Palmeira AL, et al. Psychometric and cross-national evaluation of a Portuguese version of the Impact of Weight on Quality of Life-Lite (IWQOL-Lite) questionnaire. *Eur Eat Disorders Rev* 2005;13:133-143.
24. Stunkard AJ, Messick S. The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *J Psychosom Res* 1985;29:71-83.
25. Westenhoefer J, Stunkard AJ, Pudel V. Validation of the flexible and rigid control dimensions of dietary restraint. *Int J Eat Disord* 1999;26:53-64.
26. Lopes C, Aro A, Azevedo A, Ramos E, Barros H. Intake and adipose tissue composition of fatty acids and risk of myocardial infarction in a male Portuguese community sample. J Am Diet Assoc 2007;107:276-286.

27. Blair SN, Haskell WL, Ho P, Paffenbarger RSJ, Vranizan KM, Farquhar JW, et al. Assessment of habitual physical activity by a seven-day recall in a community survey and controlled experiments. *Am J Epidemiol* 1985;122:794-804.
28. Kiernan M, Kraemer HC, Winkleby MA, King AC, Taylor CB. Do logistic regression and signal detection identify different subgroups at risk? Implications for the design of tailored interventions. *Psychol Methods* 2001;6:35-48.
29. Kiernan M, Moore SD, Schoffman DE, Lee K, King AC, Taylor CB, et al. Social support for healthy behaviors: scale psychometrics and prediction of weight loss among women in a behavioral program. *Obesity (Silver Spring)* 2012;20:756-764.
30. Signal detection software for receiver operator characteristics [WWW document]. Available from: http://www.stanford.edu/~yesavage/ROC.html. Accessed on January 2014.
31. Teixeira PJ, Silva MN, Coutinho SR, Palmeira AL, Mata J, Vieira PN, Carraça EV, Santos TC, Sardinha LB. Mediators of weight loss and weight loss maintenance in middle-aged women. *Obesity* 2010;18:725-735.
32. Jensen MD, Ryan DH, Apovian CM, Ard JD, Comuzzie AG, Donato KA, et al. 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. *J Am Coll Cardiol* 2014;63:2985-3023.
33. Teixeira PJ, Going SB, Houtkooper LB, Cussler EC, Metcalfe LL, Blew RM, et al. Exercise motivation, eating, and body image variables as predictors of weight control. *Med Scie Sports Exerc* 2006;38:179-188.
34. Teixeira PJ, Silva MN, Mata J, Palmeira AL, Markland D. Motivation, self-determination, and long-term weight control. *Int J Behav Nutr Phys Act* 2012;9:22-35.
35. Teixeira PJ, Carraca EV, Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: a systematic review. *Int J Behav Nutr Phys Act* 2012;9:78-108.
36. Mata J, Silva MN, Vieira PN, Carraça EV, Andrade AM, Coutinho SR, et al. Motivational "spill-over" during weight control: increased self-determination and exercise intrinsic motivation predict eating self-regulation. *Health Psychol* 2009;28:709-716.

37. Vieira PN, Mata J, Silva MN, Coutinho SR, Santos TC, Minderico CS, et al. Predictors of psychological well-being during behavioral obesity treatment in women. *J Obes* 2011:936153.
38. Verstuyf J, Patrick H, Vansteenkiste M, Teixeira PJ. Motivational dynamics of eating regulation: a self-determination theory perspective. *Int J Behav Nutr Phys Act* 2012;9:21-37.
39. West DS, Gorin AA, Subak LL, Foster G, Bragg C, Hecht J, et al. A motivation-focused weight loss maintenance program is an effective alternative to a skill-based approach. *Int J Obes* 2011;35:259-269.
40. Jacobs DR, Ainsworth BE, Hartman TJ, Leon AS. A simultaneous evaluation of 10 commonly used physical activity questionnaires. *Med Sci Sports Exerc* 1993;25:81-91.

CHAPTER 6

Motivation and Barriers for Leisure-Time Physical Activity in Socioeconomically Disadvantaged Women (Study V)[7]

[7] **Santos I**, Ball K, Crawford D, Teixeira PJ. (2016). Motivation and barriers for leisure-time physical activity in socioeconomically disadvantaged women. PLOS One, 11(1): e0147735. (IF: 3.234)

Abstract

Introduction: The aim of this study was to examine cross-sectional and longitudinal associations between motivation and barriers for physical activity, and physical activity behavior in women living in socioeconomic disadvantage. This study also examined whether weight control intentions moderate those associations.

Methods: Data from 1664 women aged 18-46 years was collected at baseline and three-year follow-up as part of the Resilience for Eating and Activity Despite Inequality study. In mail-based surveys, women reported sociodemographic and neighborhood environmental characteristics, intrinsic motivation, goals and perceived family barriers to be active, weight control intentions and leisure-time physical activity (assessed through the IPAQ-L). Linear regression models assessed the association of intrinsic motivation, goals and barriers with physical activity at baseline and follow-up, adjusting for environmental characteristics and also physical activity at baseline (for longitudinal analyses), and the moderating effects of weight control intentions were examined.

Results: Intrinsic motivation and, to a lesser extent, appearance and relaxation goals for being physically active were consistently associated with leisure-time physical activity at baseline and follow-up. Perceived family barriers, health, fitness, weight and stress relief goals were associated with leisure-time physical activity only at baseline. Moderated regression analyses revealed that weight control intentions significantly moderated the association between weight goals and leisure-time physical activity at baseline (β=0.538, 99% CI = 0.057, 0.990) and between intrinsic motivation and leisure-time physical activity at follow-up (β=0.666, 99% CI = 0.188, 1.145). For women actively trying to control their weight, intrinsic motivation was significantly associated with leisure-time physical activity at follow-up (β=0.184, 99% CI = 0.097, 0.313).

Conclusions: Results suggest that, especially in women trying to control their weight, intrinsic motivation plays an important role in sustaining physical activity participation over time. Also, weight goals for being physically active seem to play a role regarding short-term physical activity participation in this particular population. Addressing these motivational features may be important when promoting physical activity participation in women living in socioeconomically disadvantaged neighborhoods.

Introduction

The health benefits associated with regular participation in physical activity, as well as the positive role of physical activity for successful weight reduction and maintenance, are well documented [1, 2]. Yet, many adults in developed countries fail to meet public health guidelines for recommended levels of physical activity. For instance, 2011 data indicate that, across the World Health Organization (WHO) regions, the frequency of physical inactivity (i.e., not engaging in 30 min of moderate-intensity physical activity on at least 5 days every week or 20 min of vigorous-intensity activity on at least 3 days every week, or a combination of both) varies between 17% in southeast Asia and about 43% in the Americas and the eastern Mediterranean [3]. Of additional concern is the different sociodemographic pattern observed in physical activity participation. A systematic review of the relation between socioeconomic position and physical activity identified higher levels of total leisure-time and moderate and vigorous physical activities in individuals with higher socioeconomic status, compared with those with lower socioeconomic status [4]. Additionally, according to several reports [4-6], women living in socioeconomically disadvantaged neighborhoods are at higher risk of physical inactivity, independent of their individual socioeconomic circumstances, which could lead to more pronounced health and social inequalities. Hence, women living in socioeconomically disadvantaged neighborhoods are an important group to target in order to promote physical activity and, consequently, improve their health.

A number of predictors of physical activity participation in adults have been consistently identified, within each of the following areas: demographic and biological factors, psychological, cognitive and emotional factors, behavioral attributes and skills, social and cultural factors, physical environment factors and physical activity characteristics [7]. Perceived barriers to exercise are one of the psychological features that have been suggested as influencing physical activity participation and adherence. Of particular interest are personal barriers, especially in women, because of the lifestyle challenges they face regarding family responsibilities (e.g. childcare commitments) [8, 9]. Indeed, Brownson and colleagues have found that women more frequently report being tired and having no time available, in part due to their domestic situation, as significant perceived barriers to healthy habits than do men [10]. Moreover, Salmon and colleagues [11] showed that personal barriers such as lack of time, other priorities, work, and family

commitments were inversely associated with physical activity behavior in women. Thus, a better understanding of the common personal barriers - including family barriers - faced by women regarding positive physical activity changes will likely foster increased participation if translated to interventions.

To better understand long-term physical activity adherence, researchers have focused on the role of qualitative aspects of motivation, as described by Self-Determination Theory (SDT). Among other features, this framework specifies that people can be intrinsically or extrinsically motivated to regulate their own behavior [12, 13]. Intrinsic motivation is the most autonomous form of behavioral regulation and when intrinsically motivated to regulate their own behavior, individuals adopt a specific behavior largely for the experience of the behavior *per se*. By contrast, when extrinsically motivated, individuals can adopt specific behaviors based on external contingencies, internalized self-judgments, personal importance of its consequences, or because it is completely congruent with the person's other values [12, 13]. Additionally to the motivational regulatory processes underlying a behavior – the "why" of motivation - SDT also emphasizes the contents of individuals' goals or aspirations for a specific domain of behavior – the "what" of motivation, i.e., the outcomes that individuals are pursuing by engaging in the behavior – which can have intrinsic or extrinsic qualities [14].

A comprehensive review of the literature on the motivational features related with exercise and physical activity outcomes identified an autonomous regulatory style (including intrinsic motivation) as one of the most important factors to foster positive, meaningful, and long-lasting physical activity behavior changes [15]. Also, the pursuit of intrinsic (e.g., seeking affiliation or challenge) rather than extrinsic (e.g., seeking social recognition or appearance improvement) *exercise goals* was shown by Sebire et al. [16] to be positively associated with psychological need satisfaction in exercise, physical self-worth, psychological well-being, and self-reported exercise behavior; and by Vansteenkiste et al. [17] to have a positive effect on effort expenditure, performance, and long-term exercise persistence. Therefore, understanding the motivational dynamics of adopting a physically active lifestyle and especially sustaining it over time is a critical issue and is highly relevant for the development of physical activity interventions with lasting effects [18, 19].

Although there is a growing body of studies providing insights on the relation between these features and physical activity participation and adherence, there is a lack of studies examining such relations in socioeconomically disadvantaged populations. This

study contributes to fulfill this gap by examining cross-sectional and longitudinal associations of different aspects of physical activity motivation and perceived barriers with physical activity behavior in women living in socioeconomic disadvantage. In particular, we sought to study the association of i) intrinsic motivation; ii) physical activity goals, namely health, fitness, appearance, weight, relaxation and stress relief goals; and iii) perceived family barriers with short- and long-term leisure-time physical activity (LTPA). Also, because motivation and actual engagement in lifestyle behaviors may differ between those who have and do not have concerns regarding their weight [20], moderating effects of weight control intentions were also tested for the main associations. Importantly, we adjusted all analyses for important facets of the social and physical environment, namely the neighborhood personal safety and walking environment, since the surrounding areas where individuals live - e.g., presence of sidewalks/footpaths, proximal physical activity facilities and street lighting - may influence their choices related to physical activity in their leisure time [21].

Methods

The present study used data collected in 2007-08 (baseline) and 2010-2011 (three-year follow-up) as part of the Resilience for Eating and Activity Despite Inequality (READI) study, a longitudinal cohort study examining eating behaviors, physical activity and obesity in women and children living in socioeconomically disadvantaged neighborhoods in Victoria, Australia. The READI study was approved by the Deakin University Human Research Ethics Committee, the Victorian Department of Education, and the Catholic Education Office. All participants gave written consent to participate. A detailed description of the study is available elsewhere [22] and will only be summarized here.

Participants

Women aged between 18 and 46 years were randomly selected using the electoral roll (voting is compulsory in Australia) from 40 rural and 40 urban suburbs of Victoria identified as socioeconomically disadvantage according to the Australian Bureau of Statistics' 2001 Index of Relative Socio-economic Disadvantage (or SEIFA) [23]. The lifespan under target reflects women of childbearing age, because of their relatively high

risk for unhealthy weight gain during this life stage. The sampling source (Australian Electoral Commission) provides samples in age strata and 18-45 years was the closest match to 'childbearing age' possible within these strata. By the time women completed the survey, a small number had turned 46. A total of 11940 women were identified (150 women from each of the 80 areas; some included areas had <150 eligible women). From 4934 women (45%, excluding from the denominator those ineligible) who responded to a postal invitation to complete a questionnaire, 571 moved from the sampled neighborhood before completing the survey, 3 were not intended participants, 2 withdrew from the study and 9 did not meet the age range criteria. Thus, data from these women were excluded, leaving 4349 eligible participants at baseline. Of those, 1913 women completed three-year follow-up assessments. Additional details about the sampling and dropout in the READI study have already been reported [22].

Women who were pregnant (n=162) or who were trying to gain weight (n=57) at baseline or follow-up were excluded from analyses. Women were also excluded if they were missing data on any of these variables (n=58). Some women met more than one exclusion criteria, leaving a final sample of 1664 women.

Covariates

Sociodemographic factors. At baseline, women were asked to provide information about their sociodemographic characteristics including age, country of birth (categorized as "Australia" or "other"), highest education level (low – did not complete year 12; medium – completed year 12 or equivalent; or high – tertiary qualification), marital status (married/de facto union, previously married or never married), number of dependent children (none, one, two or three or more), employment status (working full time, working part-time or not working), personal income (categorized as low - $0-299 per week; medium - $300-699 per week; or high - $700+ per week) and household income (categorized as low - $0-699 per week; medium - $700-1499 per week; or high - $1500+ per week).

Physical and social environmental factors. Two environment-related variables were assessed at baseline (see Ball et al., 2012 [24] for full details). The neighborhood "personal safety" was assessed by responses to the following three items: "I feel safe walking in my neighborhood day or night", "Violence is not a problem in my neighborhood", and "My neighborhood is safe from crime" (Cronbach's α=0.85). The neighborhood "walking environment" was evaluated by responses to the following seven

statements: “My neighborhood offers many opportunities to be physically active”, “Local sports clubs and other facilities in my neighborhood offer many opportunities to get exercise”, “It is pleasant to walk in my neighborhood”, “The trees in my neighborhood provide enough shade”, “In my neighborhood it is easy to walk places”, “I often see other people walking in my neighborhood”, and “I often see other people exercising (e.g., jogging, bicycling, playing sports) in my neighborhood” (Cronbach’s α=0.81). Responses to each item were scored in a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) and a total score for each construct was created through the sum of the respective items.

Predictors

Eight predictor variables were selected from the baseline data in relation to physical activity participation: intrinsic motivation; health goals, fitness goals, appearance goals, weight goals, relaxation goals, stress relief goals; and perceived family barriers.

Intrinsic motivation was assessed with the following items reflecting feelings in relation to physical activity: “I enjoy it vs. I hate it”, “I feel interested vs. I feel bored”, “I find it pleasurable vs. I find it unpleasurable”, “I find it energizing vs. I find it tiring”, “It makes me happy vs. It makes me depressed”, and “I feel good physically while doing it vs. I feel bad physically while doing it” (Cronbach’s α=0.95). Answers to the six items were rated on a 7-points Likert scale ranging from 1 (most negative feeling) to 7 (most positive feeling) and a total score was calculated by summing the items.

For physical activity goals assessment, participants rated the importance of each of the following six outcomes of being physically active on a 4-point Likert scale, ranging from 1 (no reason at all) to 4 (a very important reason): “Health”, “Feeling fit”, “Appearance”, “Weight”, “Relaxation” and “Stress relief”.

Perceived family barriers was assessed by responses to the following three items: “I feel guilty doing physical activity when I have family commitments”, “My family commitments usually take priority over my physical activity”, and “I make time for physical activity even when I am busy with family commitments” (Cronbach’s α=0.79). Responses to each item were scored on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The responses to the first two items were recoded in the opposite direction and responses were then summed.

Moderator

Weight-control intention was assessed at baseline by asking women "Which of the following best describes you at the moment?", and the categories of response were: (1) I am actively doing things to gain weight at the moment; (2) I am actively doing things to try to avoid gaining weight at the moment; (3) I am actively doing things to try to lose weight at the moment; and (4) I am not doing anything in particular for my weight at the moment. Only a small proportion of women (<3%) reported trying to gain weight and therefore they were excluded from analyses since we were primarily interested in the role of weight loss/maintenance intention as a moderator. This variable was recoded in two categories: (1) no weight-control intention and (2) trying to avoid gaining weight or to lose weight.

Outcome measure

LTPA at baseline and follow-up was assessed through the long version of the self-administered International Physical Activity Questionnaire (IPAQ-L), a well-established instrument for cross-nationally monitoring population levels of physical activity and inactivity. This questionnaire is suitable for use in adults, has excellent test-retest reliability (pooled r = 0.81) and acceptable validity (mean ρ = 0.30) [25]. Women self-reported time (minutes per week) spent in walking and in moderate- and vigorous-intensity physical activity in their leisure time during the 7 days preceding the assessment, which was summed into a single variable.

Statistical Analyses

Statistical analyses were carried out using IBM SPSS for Windows, version 21.0. For univariate associations, the significance level was set at $p \leq 0.05$, corresponding to a 95% Confidence Interval (CI). For multiple linear regression analyses, the significance level was set at $p \leq 0.01$, corresponding to a 99% CI, to partially correct for the inflated type I error associated with multiple testing. A mean difference or a regression coefficient was considered statistically significant if its 95% or 99% CI did not include zero. Internal consistency estimates were calculated for the two physical environmental constructs, intrinsic motivation and perceived family barriers. Descriptive statistics were conducted, using baseline data, to characterize the sample. Independent-sample *t* tests for age and chi-square tests for categorical variables were used to compare differences between women who were trying to control weight and women who were not trying to control weight. The

variable LTPA at baseline and follow-up was non-normally distributed, so logarithmic transformations (natural logarithm) were applied before inclusion in analyses.

Univariate associations of all sociodemographic and a priori selected physical and social environmental variables with LTPA at baseline were examined using linear regression models. All of those variables significantly associated with LTPA at baseline (highest education level, number of dependent children, employment status, personal income, household income and neighborhood "walking environment") were used as covariates in multiple linear regression models, which were conducted to assess the association between each motivational variable and perceived family barriers and the dependent measure. Subsequently, for each significant association, moderating effects were examined by additionally including the main effect of the weight control intentions (the moderator) into the linear regression models, followed by the interaction between each of the independent variables and weight control intentions.

For prospective analyses, a similar procedure was developed: linear regression modeling was used to assess the relationship between each of the sociodemographic and physical and social environmental variables and LTPA at follow-up, adjusting for LTPA at baseline; those variables significantly associated with the outcome (number of dependent children, employment status and personal income) were then included as covariates in subsequent multiple linear regressions, which were derived to evaluate the association between each motivational variable and perceived family barriers and LTPA at follow-up, always controlling for LTPA at baseline; additionally, for each significant association, the potential moderator (weight control intentions) and the interaction between each of the independent variables and the moderator were introduced in the linear regression models.

If there was a significant moderator effect in either cross-sectional (which was the case for weight goals) or prospective analyses (which was verified for intrinsic motivation), the sample was stratified by trying to control weight/no weight-control intentions and linear regressions models were performed to examine associations between the independent and dependent variables within each group.

Results

The mean age of women was 36.4 (s.d. = 7.7) years. The majority was born in Australia (92.2%) and was married (70.4%). About one third of the women had no

dependent children, 48.5% had medium level of education, 36.5% had a full time job and 36.8% and 49.0% had medium personal and household income, respectively. Compared with women who were not trying to control their weight, women who were trying to lose or maintain weight were more likely to be highly educated (X^2 = 7.568, 95% CI = 0.019, 0.025), unmarried (X^2 = 6.797, 95% CI = 0.027, 0.034) and had higher household income (X^2 = 6.786, 95% CI = 0.031, 0.038). There were no between-group differences with respect to age, country of birth, number of dependent children, employment status and personal income.

Associations of sociodemographic and physical and social environmental factors with LTPA at baseline and follow-up are displayed in Table 1. Regarding sociodemographic factors, highest educational level, employment status, personal income and household income were positively associated with LTPA at baseline and employment status and personal income were positively associated with LTPA at follow-up regardless of baseline LTPA, while number of dependent children had a negative association with both LTPA at baseline and follow-up. Of the physical and social environmental factors, only neighborhood "walking environment" was positively associated with LTPA at baseline and none had significant associations with LTPA at follow-up.

Table 2 shows associations of motivational variables and perceived family barriers at baseline with LTPA at baseline, and the moderating effects of weight control intentions. All of the predictor variables, including weight control intentions, showed positive associations with the dependent variable (model A). However, results of the moderated regression analyses (model B) indicated that at baseline, weight control intentions only had a moderator effect in the associations between weight goals for being physically active and LTPA (β = 0.538, 99% CI = 0.057, 0.990). When the sample was stratified by weight control intentions, weight goals were not significantly associated with LTPA at baseline for either women actively trying to control their weight (β = 0.078, 99% CI = -0.021, 0.194) and women who were not trying to control their weight (β = -0.103, 99% CI = -0.228, 0.038).

Table 3 presents associations of motivational variables and perceived family barriers at baseline with LTPA at follow-up, controlling for LTPA at baseline, and moderator effects of weight control intentions. Intrinsic motivation, appearance and relaxation goals for being physically active and weight control intention showed positive associations with LTPA at follow-up (model A). Moderated regression analyses (model B) revealed that weight control intentions only significantly moderated the association

Table 1. Univariate associations of sociodemographic and physical and social environmental factors with leisure-time physical activity

	Leisure-time physical activity at baseline	**Leisure-time physical activity at follow-up[1]**
Variables	**Standardized β (95% CI)**	**Standardized β (95% CI)**
Sociodemographic factors		
Age	-0.045 (-0.094, 0.004)	0.001 (-0.053, 0.054)
Country of birth	0.032 (-0.017, 0.082)	-0.010 (-0.065, 0.045)
Highest education level (ref. =low)		
Medium	**0.133** (0.072, 0.195)	-0.041 (-0.113, 0.032)
High	**0.213** (0.151, 0.274)	-0.037 (-0.108, 0.034)
Marital status (ref. =never married)		
Married / de facto	-0.049 (-0.104, 0.006)	-0.048 (-0.108, 0.013)
Previously married	-0.037 (-0.093, 0.018)	-0.023 (-0.085, 0.038)
Number of dependent children (ref. =none)		
One	**-0.082** (-0.137, -0.027)	**-0.068** (-0.131, -0.008)
Two	**-0.084** (-0.140, -0.028)	-0.019 (-0.081, 0.043)
Three or more	**-0.060** (-0.114, -0.005)	0.036 (-0.025, 0.097)
Employment status (ref. = not working)		
Working full time	**0.070** (0.012, 0.128)	**0.085** (0.019, 0.148)
Working part-time	**0.066** (0.008, 0.125)	0.006 (-0.059, 0.071)
Personal income (ref. =low)		
Medium	0.040 (-0.019, 0.099)	0.020 (-0.047, 0.088)
High	**0.099** (0.039, 0.157)	**0.081** (0.014, 0.145)

Household income (ref. =low)		
Medium	**0.114** (0.037, 0.186)	0.040 (-0.047, 0.127)
High	**0.156** (0.077, 0.226)	0.050 (-0.036, 0.135)
Physical and social environmental factors		
Neighborhood "personal safety"	0.045 (-0.004, 0.094)	-0.022 (-0.077, 0.033)
Neighborhood "walking environment"	**0.163** (0.115, 0.212)	0.032 (-0.023, 0.088)

Statistical significance is represented in bold type.

[1] adjusted for leisure-time physical activity at baseline

Table 2. Associations between physical activity motivation and barriers and leisure-time physical activity at baseline, and moderator effects of weight control intentions

	Model A[1]	Model B[2]		
	Main effect of independent variable	**Main effect of independent variable**	**Main effect of moderator (weight control intentions)**	**Interactions (independent variable x moderator)**
Intrinsic motivation	**0.380** (0.295, 0.447)	**0.337** (0.069, 0.589)	0.152 (-0.154, 0.452)	0.020 (-0.406, 0.444)
Health goals	**0.082** (0.001, 0.166)	-0.027 (-0.293, 0.238)	0.083 (-0.378, 0.540)	0.171 (-0.386, 0.718)
Fitness goals	**0.128** (0.048, 0.209)	-0.056 (-0.336, 0.224)	0.023 (-0.328, 0.373)	0.270 (-0.208, 0.735)
Appearance goals	**0.124** (0.044, 0.199)	-0.029 (-0.323, 0.266)	0.128 (-0.146, 0.394)	0.145 (-0.296, 0.576)
Weight goals	**0.084** (0.004, 0.162)	**-0.286** (-0.550, -0.017)	-0.123 (-0.439, 0.199)	**0.538** (0.057, 0.990)
Relaxation goals	**0.134** (0.053, 0.210)	0.170 (-0.123, 0.456)	**0.266** (0.015, 0.504)	-0.065 (-0.439, 0.314)
Stress relief goals	**0.106** (0.026, 0.184)	0.053 (-0.236, 0.340)	0.191 (-0.069, 0.443)	0.054 (-0.335, 0.439)
Perceived family barriers	**0.202** (0.123, 0.293)	0.118 (-0.188, 0.430)	0.170 (-0.037, 0.370)	0.079 (-0.302, 0.464)

Data reported as Standardized β with 99% Confidence Intervals to partially correct for the inflated type I error associated with multiple testing (statistical significance is represented in bold type).

[1]Associations between each independent variable and the dependent variable, adjusted for highest education level, number of dependent children, employment status, personal income, household income and neighborhood "walking environment"

[2] Interactions between each independent variable and the moderator, adjusted for highest education level, number of dependent children, employment status, personal income, household income and neighborhood "walking environment"

between intrinsic motivation and LTPA at follow-up (β = 0.666, 99% CI = 0.188, 1.145). When stratified by weight control intentions (Fig. 1), intrinsic motivation was significantly associated with LTPA at follow-up for women actively trying to lose or maintain weight (β = 0.184, 99% CI = 0.097, 0.313), but not for women with no weight-control intentions (β = -0.011, 99% CI = -0.159, 0.139).

For a more specific analysis of how intrinsic motivation related to LTPA, two groups representing the first (lowest) and third (highest) tertiles of adjusted intrinsic motivation means at baseline were created. Fig. 2 shows associations between these groups and LTPA at baseline and follow-up (controlling and not controlling for weight control intentions and LTPA at baseline). At follow-up, LTPA participation was higher for both groups of intrinsic motivation and the group displaying higher intrinsic motivation showed higher participation in LTPA at both baseline and follow-up.

Discussion

Socioeconomically disadvantaged individuals are at higher risk of physical inactivity [4-6] and have been understudied concerning physical activity correlates. To our knowledge, this is the first study to examine cross-sectional and prospective associations of motivational factors and perceived family barriers with physical activity behavior in a large sample of women living in socioeconomically disadvantaged communities. As expected, results showed that all motivational variables and perceived family barriers were correlated with LTPA at baseline, even after adjusting for sociodemographic and physical and social environmental factors. Across analyses, intrinsic motivation was consistently associated with LTPA (independently of significant sociodemographic factors and also baseline values of LTPA in prospective analysis), suggesting, in line with SDT, that the perception of enjoyment, interest and challenge present when engaging in the behavior are important driving forces of sustained behavioral adherence [15]. Regarding goals for being physically active, relaxation goals were consistently associated with physical activity participation (independently of significant covariates), although less strongly at follow-up.

Results from this study are in agreement with prior research showing a consistent positive association of intrinsic motivation and more intrinsic goals with exercise [15]. Although stress relief goals are more intrinsically-oriented, they did not predict physical activity participation at follow-up. Appearance goals were also associated with physical

Table 3. Associations between physical activity motivation and barriers and leisure-time physical activity at follow-up, and moderator effects of weight control intentions

	Model A[1]	Model B[2]		
	Main effect of independent variable	**Main effect of independent variable**	**Main effect of moderator (weight control intentions)**	**Interactions (independent variable x moderator)**
Intrinsic motivation	**0.140** (0.060, 0.234)	-0.251 (-0.564, 0.036)	**-0.381** (-0.737, -0.032)	**0.666** (0.188, 1.145)
Health goals	0.042 (-0.037, 0.125)			
Fitness goals	0.061 (0.017, 0.142)			
Appearance goals	**0.078** (0.000, 0.154)	-0.178 (-0.478, 0.125)	-0.114 (-0.389, 0.158)	0.356 (-0.090, 0.793)
Weight goals	0.044 (-0.033, 0.123)			
Relaxation goals	**0.097** (0.018, 0.175)	-0.040 (-0.331, 0.252)	-0.008 (-0.258, 0.242)	0.183 (-0.198, 0.560)
Stress relief goals	0.077 (-0.001, 0.153)			
Perceived family barriers	0.046 (-0.036, 0.126)			

Data reported as Standardized β with 99% Confidence Intervals to partially correct for the inflated type I error associated with multiple testing (statistical significance is represented in bold type).

[1]Associations between each independent variable and the dependent variable, adjusted for leisure-time physical activity at baseline, number of dependent children, employment status and personal income

[2] Interactions between each independent variable and the moderator, adjusted for leisure-time physical activity at baseline, number of dependent children, employment status and personal income

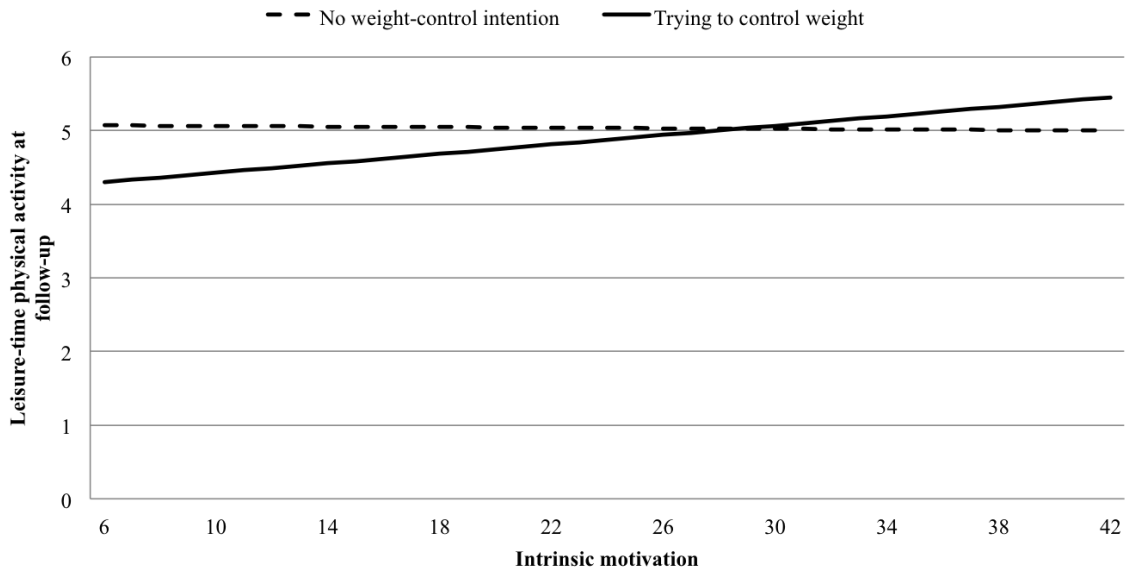


Fig. 1. Associations between intrinsic motivation and leisure-time physical activity at follow-up among women trying vs. not trying to control their weight.

Note: plots show associations when leisure-time physical activity at baseline was fixed at the geometric mean, number of dependent children was fixed to two, employment status was fixed to working full time and personal income was fixed to medium.

activity participation (also less strongly at follow-up), although mixed associations of body-related goals with exercise have been observed in other studies [15]. Indeed, according to SDT, some goals can have both intrinsic and extrinsic motivational features, depending on the level of autonomy (or personal endorsement) involved in choosing that behavior. Individuals with more self-determined motivation can sustain adherence to a particular behavior (in this case, LTPA) even holding extrinsic goals (e.g., improving appearance) [26]. Finally, weight, fitness, and health goals did not predict LTPA at follow-up. According to Markland and Ingledew [26], weight-related goals tend to be experienced as controlling and so contribute little to long-term physical activity participation, although mixed results are reported across studies. Supplementary exploratory factor analysis including the six items (data not shown) revealed weight goals grouped in a latent construct with appearance goals (Cronbach's α=0.71), suggesting a more extrinsic nature. Similarly, the literature also shows mixed results for fitness and health goals, possibly because they can reflect either more controlling or more autonomous reasons like pursuing a socially-valued body image or health pressures exerted by the medical doctor *versus*

increasing physical function and competence or a genuine desire for health improvement, respectively [15].

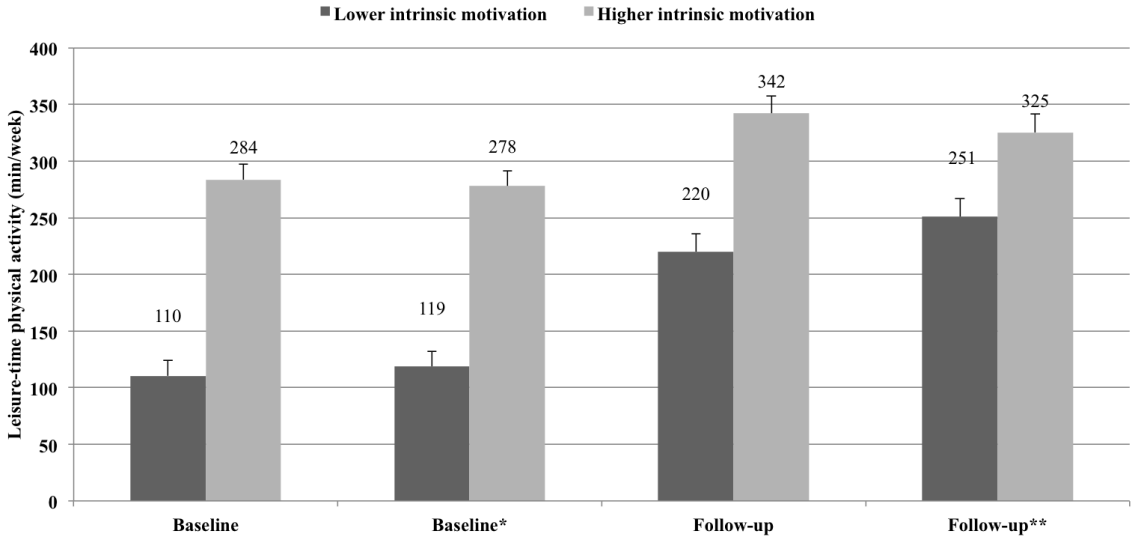


Fig. 2. Associations between intrinsic motivation and leisure-time physical activity at baseline and at follow-up (between-group comparisons of estimated marginal means with linearly independent pairwise tests: baseline – mean dif. = -173 min/week, 99% CI = -223, -124; baseline* - mean dif. = -159 min/week, 99% CI = -209, -110; follow-up – mean dif. = -122 min/week, 99% CI = -175, -69; follow-up** - mean dif. = -74 min/week, 99% CI = -131, -18).
Note: Groups represent the lowest and highest tertile-split groups of adjusted intrinsic motivation means at baseline. At baseline, adjustments were made for highest education level, number of dependent children, employment status, personal income, household income and neighborhood "walking environment" (*and weight control intentions); at follow-up, adjustments were made for number of dependent children, employment status and personal income (**and leisure-time physical activity at baseline and weight control intentions).
Error bars indicate the standard error of the mean.

The fact that this population faces socioeconomic disadvantage - which may pose several challenges to daily life, including financial, social and environmental stressors - can partially explain the non-significant results for fitness and health goals and physical activity participation at follow-up, as these goals may assume relatively less importance to the short-term subsistence or to other pressing priorities in this kind of populations. Health is a generalized concept, it has more expression in the presence of sickness, and it can involve other factors related with stress and well-being. Thus, the health-related goals expressed initially (including being physically healthy) may fade away in time and be

replaced by other (more valued) goals linked with relaxation and enjoyment associated with long-term physical activity participation. This can also be applied to understand perceived family barriers. In the long run, people may experience feelings of mastery and efficacy in overcoming perceived barriers and so perceived family barriers may become less important or disappear. In fact, in the context of a cognitive-behavior weight loss intervention, Linde *et al*. showed that self-efficacy for exercise behaviors (which is closely related with perceived barriers for exercise) was significantly associated with exercise behaviors and with weight loss monitoring behaviors, such as days of tracking adherence to physical activity plans during the treatment period, but not during follow-up [27].

By conducting analyses that examined motivational variables and perceived family barriers as main correlates of physical activity, and weight-control intention as a moderator of these relations, we were able to examine specifically whether these associations differed in women who were trying *versus* not trying to control weight. Since a large proportion of adults, worldwide, report that they are trying to control their weight [28-31], including women living in socioeconomic disadvantage [32], addressing this issue is particularly important for informing the development of interventions that are appropriately tailored to the population of interest. Weight-control intention moderated the association between weight goals for being physically active and LTPA at baseline, suggesting that establishing weight-related goals and trying to control weight simultaneously predicts physical activity participation (at least cross-sectionally). In prospective analyses, weight-control intention moderated the association between intrinsic motivation and LTPA. When the sample was stratified by weight control intentions, we observed that intrinsic motivation was associated with LTPA at follow-up, irrespective of baseline LTPA, for women actively trying to control their weight at baseline. These results suggest that especially in women initially trying to lose and maintain weight, finding a source of intrinsic motivation may be critical in the longer term. These findings are consistent with results from a weight management intervention showing that, in overweight and obese women who underwent to a 1-year SDT-based intervention, not all types of motivation predicted physical activity and weight loss maintenance; intrinsic and autonomous motivation were the only predictors of long-term outcomes [33, 34].

Strengths of the study include the longitudinal prospective design; the large sample of women living in socioeconomically disadvantaged neighborhoods, a high risk population group for overweight and other health problems, difficult to reach in research studies and interventions; and the wide variety of potential sociodemographic and physical

and social environment confounders in physical activity behavior. To our knowledge, very few physical activity long-term participation studies have controlled for a strong set of environmental variables.

This study has also limitations, namely the relatively low response rate (45%), which possibly makes the sample less representative of the women living in socioeconomically disadvantaged neighborhoods – comparing with the general population of women living in the 80 neighborhoods, a greater proportion of READI women was Australian born and was married or living as married, but a lower proportion was in full-time employment [22] – and perhaps show a selection bias towards more motivated women; the limited age range (18-46 years) of the women, making results not generalizable to other age groups of this particular population; and the self-report nature of all constructs, particularly LTPA, which can be affected by recall difficulties and possible overestimations of frequency and duration [35]. Future studies should include objective measurements, such as accelerometry. Another limitation relates to the scales used to assess physical activity motivation and goals. This study was part of a larger study – the READI study – and the definition of the assessments was established prior to the current analysis; therefore, motivational constructs were not assessed with standardized instruments. However, the items used in each construct are very similar to the ones included in validated and commonly used SDT-based instruments (e.g., the Intrinsic Motivation Inventory [36]) and showed good internal consistency. Also, physical activity goals were assessed with single-item measures, which is less than ideal. Although multiple-item scales tend to be more reliable in psychometric assessment and ensure content validity, a single item may be adequate when the construct is highly schematized for most individuals, reflects subjective experience, and when the content of the construct is unidimensional [37] as in this case. Bergkvist and Rossiter reported empirical findings indicating that both single-item and multiple-item measures had equally high predictive validity [38, 39].

Finally, the prospective nature of the analyses included in this study is less than sufficient for causality between baseline predictors and follow-up measures to be inferred. Results should only be interpreted as suggestive and supportive of the hypotheses that the significant prospective correlates may indeed exert effects over time on the outcomes of interest.

Conclusions

The present findings suggest that disadvantaged women who are attempting to lose or maintain weight and also report high levels of intrinsic motivation may be more protected regarding their LTPA levels over time. Also, in this particular population, weight-related physical activity goals seem to play a role regarding short-term LTPA participation. Based on the current results, weight loss interventions focusing on promoting intrinsic motivation may be especially effective to result in LTPA adherence in this specific population subgroup.

Funding

This study was funded by the Portuguese Science and Technology Foundation (grant number SFRH/BD/80739/2011 attributed to Inês Santos). Analyses for the current paper were part of the MeMo International Exchange programme funded under Marie Curie Actions (FP7-PEOPLE-2009-IRSES-247630). The READI study was funded by an Australian National Health & Medical Research Council Strategic Award (Grant number 374241).

References

1. Catenacci VA, Wyatt HR. The role of physical activity in producing and maintaining weight loss. Nat Clin Pract Endocrinol Metab. 2007;3: 518-529.
2. Donnelly JE, Blair SN, Jakicic JM, Manore MM, Rankin JW, Smith BK. American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. Med Sci Sports Exerc. 2009;41: 459-471.
3. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet. 2012;380: 247-257.
4. Gildow C, Johnston LH, Crone D, Ellis N, James D. A systematic review of the relationship between socio-economic position and physical activity. Health Educ J. 2006;65: 338-367.

5. Giles-Corti B, Donovan RJ. Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. Prev Med. 2002;35: 601-611.
6. Salmon J, Owen N, Bauman A, Schmitz MK, Booth M. Leisure-time, occupational, and household physical activity among professional, skilled, and less-skilled workers and homemakers. Prev Med. 2000;30: 191-199.
7. Bauman AE, Sallis JF, Dzewaltowski DA, Owen N. Toward a better understanding of the influences on physical activity: the role of determinants, correlates, causal variables, mediators, moderators, and confounders. Am J Prev Med. 2002;23: 5-14.
8. El Ansari W, Lovell G. Barriers to exercise in younger and older non-exercising adult women: a cross sectional study in London, United Kingdom. Int J Environ Res Public Health. 2009;6: 1443-1455.
9. Verhoef MJ, Love EJ, Rose MS. Women's social roles and their exercise participation. Women Health. 1992;19: 15-29.
10. Brownson RC, Baker EA, Housemann RA, Brennan LK, Bacak SJ. Environmental and policy determinants of physical activity in the United States. Am J Public Health. 2001;91: 1995-2003.
11. Salmon J, Owen N, Crawford D, Bauman A, Sallis JF. Physical activity and sedentary behavior: a population-based study of barriers, enjoyment, and preference. Health Psychol. 2003;22: 178-188.
12. Deci EL, Ryan RM. The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry. 2000;11: 227-268.
13. Deci EL, Ryan RM. Self-determination theory: A macrotheory of human motivation, development, and health. Can Psychol. 2008;49: 182-185.
14. Ryan RM, Sheldon KM, Kasser T, Deci EL. All goals are not created equal: An organismic perspective on the nature of goals and their regulation. In: Gollwitzer PM, Bargh JA, editors. The psychology of action: Linking cognition and motivation to behaviour. New York: The Guilford Press; 1996. p. 7-26.
15. Teixeira PJ, Carraca EV, Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: a systematic review. Int J Behav Nutr Phys Act. 2012;9: 78-108.
16. Sebire SJ, Standage M, Vansteenkiste M. Examining intrinsic versus extrinsic exercise goals: Cognitive, affective, and behavioral outcomes. J Sport Exerc Psychol. 2009;31: 189-210.

17. Vansteenkiste M, Simons J, Soenens B, Lens W. How to Become a Persevering Exerciser? Providing a clear, future intrinsic goal in an autonomy-supportive way. J Sport Exerc Psychol. 2004;26: 232-249.
18. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. Med Sci Sports Exerc. 2011;43: 1334-1359.
19. Silva MN, Teixeira PJ. Promotion of and adherence to physical activity. In: Mooren FC, Skinner JS, editors. Encyclopedia of Exercise Medicine in Health and Disease: Springer Berlin Heidelberg; 2012. p. 727-731.
20. Segar M, Spruijt-Metz D, Nolen-Hoeksema S. Go Figure? Body-shape motives are associated with decreased physical activity participation among midlife women. Sex Roles. 2006;54: 175-187.
21. Duncan MJ, Spence JC, Mummery WK. Perceived environment and physical activity: a meta-analysis of selected environmental characteristics. Int J Behav Nutr Phys Act. 2005;2: 11-20.
22. Ball K, Cleland V, Salmon J, Timperio AF, McNaughton S, Thornton L, et al. Cohort Profile: The Resilience for Eating and Activity Despite Inequality (READI) study. Int J Epidemiol. 2013;42: 1629-1639.
23. Census of Population and Housing - Socio-Economic Indexes for Areas, Australia 2001. Available: http://www.ausstats.abs.gov.au/ausstats/free.nsf/0/AFF5E8542B58B94ECA256DD5007A3DF8/$File/20390_2001.pdf.
24. Ball K, Abbott G, Cleland V, Timperio A, Thornton L, Mishra G, et al. Resilience to obesity among socioeconomically disadvantaged women: the READI study. Int J Obes (Lond). 2012;36: 855-865.
25. Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35: 1381-1395.
26. Markland D, Ingledew DK. Exercise participation motives: A self-determination theory perspective. In: Hagger MS, Chatzisarantis NLD, editors. Intrinsic motivation and self-determination in exercise and sport. Champaign, IL: Human Kinetics; 2007. p. 23-34.

27. Linde JA, Rothman AJ, Baldwin AS, Jeffery RW. The impact of self-efficacy on behavior change and weight change among overweight participants in a weight loss trial. Health Psychol. 2006;25: 282-291.
28. Yaemsiri S, Slining MM, Agarwal SK. Perceived weight status, overweight diagnosis, and weight control among US adults: the NHANES 2003-2008 Study. Int J Obes (Lond). 2011;35: 1063-1070.
29. Andreyeva T, Long MW, Henderson KE, Grode GM. Trying to lose weight: diet strategies among Americans with overweight or obesity in 1996 and 2003. J Am Diet Assoc. 2010;110: 535-542.
30. Korkeila M, Rissanen A, Kaprio J, Sorensen TI, Koskenvuo M. Weight-loss attempts and risk of major weight gain: a prospective study in Finnish adults. Am J Clin Nutr. 1999;70: 965-975.
31. Jackson SE, Wardle J, Johnson F, Finer N, Beeken RJ. The impact of a health professional recommendation on weight loss attempts in overweight and obese British adults: a cross-sectional analysis. BMJ Open. 2013;3: e003693.
32. Jeffery RW, Abbott G, Ball K, Crawford D. Behavior and weight correlates of weight-control efforts in Australian women living in disadvantage: The READI study. Int J Behav Nutr Phys Act. 2013;10: 52-70.
33. Silva MN, Markland D, Carraca EV, Vieira PN, Coutinho SR, Minderico CS, et al. Exercise autonomous motivation predicts 3-yr weight loss in women. Med Scie Sports Exerc. 2011;43: 728-737.
34. Santos I, Mata J, Silva MN, Sardinha LB, Teixeira PJ. Predicting long-term weight loss maintenance in previously overweight women: A signal detection approach. Obesity (Silver Spring). 2015;23: 957-964.
35. Sallis JF, Saelens BE. Assessment of physical activity by self-report: status, limitations, and future directions. Res Q Exerc Sport. 2000;71: S1-S14.
36. McAuley E, Duncan T, Tammen VV. Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: a confirmatory factor analysis. Res Quarterly Exerc Sport. 1989;60: 48-58.
37. Robins RW, Hendin HM, Trzesniewski KH. Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. Personality Social Psychol Bullet. 2001;27: 151-161.
38. Bergkvist L, Rossiter JR. The predictive validity of multiple-item versus single-item measures of the same constructs. J Marketing Res. 2007;44: 175-184.

39. Bergkvist L, Rossiter JR. Tailor-made single-item measures of doubly concrete constructs. Int J Advertising. 2009;28: 607-621.

CHAPTER 7

General Discussion

Overview

Losing weight and keeping it off in the long-term continues to be a major challenge worldwide. Most behavioral weight loss interventions, combining diet, physical activity, and cognitive strategies usually show short-term success (peaking at around six months into the weight loss attempts), with weight lost gradually regained in most individuals (1). In fact, individual variability, alongside with long-term adherence to weight management regimens represent significant barriers to attain success (2). However, evidence from real world examples (e.g., NWCR (3), PWCR (4)) show that many individuals are successful in their weight loss and maintenance attempts. Nevertheless, the evidence base in the field of successful weight loss and its maintenance is still in its early stages and it is important to gain a better understanding of the individuals across the world who are seeking weight loss and maintenance, and what are the most relevant behavioral and psychological aspects influencing the process of successful weight loss maintenance, in order to develop evidence-based, more successful tailored-solutions for weight loss maintenance. This thesis addressed this issue by i) assessing the prevalence of weight control attempts and identify correlates, personal strategies used and underlying motives; ii) examining behavioral and psychological characteristics as predictors of successful weight loss and maintenance; and iii) identifying psychological predictors of physical activity, a critical behavior for successful weight loss and maintenance.

Gaps highlighted in the literature gave rise to the five empirical studies incorporated in the present thesis, which provide a unique contribution to the existing knowledge base of attempting and achieving weight loss and maintenance, on an international level. A detailed discussion of theoretical and practical implications of each study's main findings was integrated in the respective chapters. Thus, the purpose of this general discussion is to gather and integrate the contributions of the five studies by summarizing the main results and reflecting on the key messages and implications for future research and practice. Methodological considerations of these studies and possible avenues for future research are also addressed.

Main research findings

What is known about weight control attempts in adults?

The first study (**Chapter 2**) was designed to systematically synthesize and meta-analyze the available epidemiological data on the prevalence of weight control (weight loss and weight maintenance) attempts among adults worldwide, and to provide a comprehensive description of the personal strategies used in those attempts and the underlying motives. No prior study published in the literature provided such a global perspective. Only epidemiological/observational studies of adults (≥18y) reporting the prevalence of weight control attempts in the past-year were included (k = 72; n = 1,184,942). Results from high quality studies showed that about 42% of adults from general populations and 44% of adults from ethnic-minority populations reported trying to *lose* weight, and about 23% of adults from general populations reported trying to *maintain* weight annually. As these prevalence estimates may vary according to various factors, potential moderators were examined, namely the decade when the survey was conducted, the geographic region where the survey took place, the proportion of overweight and obese individuals in the samples, the proportion of women in the samples, and the mean age of the samples. Based on high quality studies, higher prevalence rates of weight *loss* attempts among adults from general populations were found in the decade of 2000-2009 and in Europe and Central Asia. Additionally, higher prevalence of weight *loss* attempts was observed in overweight and obese persons and in women.

Across populations, 37 different cognitive and behavioral personal strategies (grouped in 10 domains of the Oxford Food and Activity Behaviors Taxonomy (5)) were reported for managing weight, standing out physical activity (within the energy compensation domain) and dieting (within the restrain domain). Furthermore, 12 different motives for trying to manage weight were reported, the most common being increasing wellbeing and achieving long-term health. This broad picture of weight control attempts among adults worldwide provides valuable evidence for improving planning and resource allocation in future public health weight control initiatives.

Due to the fact that there was no current representative data available on the prevalence of weight control attempts, and related behaviors and motives, among adults in Portugal, the second study (**Chapter 3**) focused on this topic. For this purpose, a specific questionnaire was developed (see Appendices) and data were collected from a

representative sample of 1098 Portuguese individuals by telephone interviews. Results showed that in 2012 about 24% of Portuguese adults were trying to *lose* weight and 19% were trying to *maintain* weight. More specifically, 53% of women and 35% of men, and 56% of overweight and obese individuals and 39% of normal weight individuals, were trying to control their weight. Weight control attempts were positively associated with higher educational level in men and with residence region (higher in Lisbon and Madeira) in women. Moreover, the most frequently used behavioral strategy to control weight was regular vegetables consumption and the most frequently reported motives for trying to control weight were improving health and preventing future diseases, and improving wellbeing. These findings contribute to a better understanding of weight management in Portugal from the perspective of the individuals actively seeking it, and could be useful in the development of appropriate and tailored weight control initiatives in the country.

After the more descriptive data from the first and second studies, both at a global and national level, indicating that managing weight is a matter of concern to a large segment of the adult population across the globe, the next logical step was to better understand who succeeds in weight loss and maintenance, by looking at predictors of success.

What predicts successful weight loss and maintenance?

The third study (**Chapter 4**) intended to describe the dietary intake and physical activity patterns and behaviors of successful weight loss maintainers and to examine associations between these behaviors and weight loss maintenance. For the purpose of this study, we used data from the Portuguese Weight Control Registry (n=388), which consists of an ongoing voluntary registry of adults who have been successful at losing at least 5 kg and have kept the weight off for at least 1 year. On average, participants lost 18 kg (19% of initial body weight) and maintained this weight loss for ~28 months. Results indicate that weight loss and maintenance is possible through the adoption of an isoenergetic diet (2199 kcal per day, on average) and regular/high participation in moderate-plus-vigorous physical activity (roughly 40 minutes per day) – with men having higher average energy intake and expenditure than women, although with large variability - and also through different sets of behavioral strategies, the most commonly reported being keeping healthy foods available at home, consuming vegetables on a regular basis and having breakfast daily. Correlates of greater weight losses included higher levels of physical activity,

walking (instead of driving or taking public transports), weight self-monitoring, establishing specific goals in what concerns to diet and physical activity patterns, and also reducing portion size, reducing the consumption of carbohydrates-rich foods, and increasing the consumption of protein-rich foods. Since there is a variety of potentially successful behaviors and strategies (similarly to what was found in other groups of successful long-term weight loss maintainers (6)), these results further suggest that individuals need to find a formula that personally fits their characteristics, a finding that should be considered in future weight management interventions.

While long-term weight stability after weight reduction seems possible for some individuals, why is it still a challenge for so many others? To explore this question, the fourth study (**Chapter 5**) sought to investigate not only behavioral but also psychological predictors of weight loss maintenance in the context of a longitudinal randomized controlled trial (the PESO study – 'Promotion of Exercise and Health in Obesity') with a 1-year intervention plus a 2-year follow-up (with no intervention), aiming at promoting long-term weight management in overweight and obese women (7, 8). The intervention's principles and style was based on self-determination theory (9, 10) with a special focus on increasing participants' autonomous motivation toward exercise and eating behaviors (the control group received a general health education curriculum). Participants who completed the 3-year assessments and had valid data were included in this study (n=154). Through the application of signal detection methods (11, 12), the best post-treatment predictors (within a set of 28 behavioral and psychological potential ones) of at least 3%, 5%, and 10% weight loss at 3-years were identified in a hierarchical fashion, creating profiles of success: women with a more positive body image after the 1-year intervention were most likely to achieve at least 3% or 5% weight loss maintenance and high intrinsic motivation buffered the effect of poor body image (i.e., women with poor body image but higher intrinsic motivation were more likely to maintain weight loss than women with poor body image and lower motivation). Among women who had achieved 10% or more weight loss, high exercise autonomous motivation was the strongest predictor and perceiving fewer exercise barriers had a partial compensatory effect for lower autonomous motivation (i.e., these women were more likely to maintain weight loss than women with lower autonomous motivation but more perceived exercise barriers). These results are consistent with previous findings (13), suggesting that body image and autonomous motivation are two promising intervention targets for successful long-term weight management, and extend

those findings by pointing to additional candidate targets, such as reducing perceived barriers to exercise. The cut-off values suggested (e.g., autonomous motivation above 54 points) may be of particular relevance for clinical practice. Importantly, these most successful subgroups of women also showed a better profile in terms of the other psychological and behavioral variables (including higher psychological wellbeing, quality of life, perceived choice and self-efficacy), comparing with the least successful subgroups, which also speak to the importance of 'healthy' behavioral synergies for long-term success.

What predicts engagement in critical behaviors for successful weight loss and maintenance?

Informed by the prior propositions that targeting psychological factors underlying the weight control-related behaviors, namely motivational aspects, may be promising for long-term success, the fifth study (**Chapter 6**) examined different aspects of exercise motivation, including intrinsic motivation; health, fitness, appearance, weight, relaxation and stress relief goals; and perceived family barriers as short- and long-term predictors of physical activity, an effective weight control behavior (14). In addition, this study sought to analyze whether weight control attempts (trying *vs.* not trying to control weight) moderated these associations. For this purpose, we used data from 1664 adult women collected as part of the READI ('Resilience for Eating and Activity Despite Inequality') study. In line with previous findings, results revealed that intrinsic motivation was consistently associated with short- and long-term leisure-time physical activity participation. Appearance and relaxation goals for being physically active were also consistently associated with leisure-time physical activity, although less strongly in the long-term. All other motivational variables and perceived family barriers were associated with short-term physical activity behavior only. Further, results showed that weight control attempts moderated the association between weight goals and short-term physical activity participation and between intrinsic motivation and long-term physical activity participation. In women trying to lose and maintain weight, intrinsic motivation was particularly important for long-term physical activity behavior. Thus, this study confirmed that addressing these motivational features might be important when promoting engagement in critical behaviors for successful weight loss and maintenance, specifically physical activity.

Theoretical and practical implications and future directions

From attempting…

Insights into the public's response to the excess weight problem

Behaviors are key determinants of people's health. There is convincing evidence that healthy behaviors including smoking abstinence, regular exercise, and weight management are associated with good health and enhanced lifespan (15). Thus, changing from unhealthy to healthy behaviors is an important component for reducing disease incidence and burden. Personal attempts to change health-related behaviors (e.g., trying to quit smoking) reflect individual's voluntary actions to improve their lifestyle (15). In the obesity field, personal weight control attempts (i.e., trying to adopt specific behaviors to lose or maintain weight) assume particular importance as they mirror people's response to the excess weight problem. In Chapter 2 we compiled the available epidemiological data on personal weight control attempts across the globe, confirming that prevalence rates of weight loss attempts have been at par with the excess weight reality. In other words, individuals (mostly with excess weight) have been taking action to control their weight in an ascendant fashion across the years.

Interestingly, it is that it is apparent from the present data that many normal weight individuals also attempt to lose weight, particularly women, as evidenced in Chapter 3. In fact, women tend to have a distorted perception of their weight, perceiving themselves as being overweight even when they are not (16). Additionally, many women (and arguably many men as well) feel dissatisfied with their body image and pressured to lose weight due to the high emphasis that society places on body shape ideals. Society constantly cultivates thinness, by exposing individuals (particularly women) - through advertisements and mass media - to images of ultra-thin ideals, which carry an array of symbolic meanings as happiness or success, encouraging and rewarding those who strive for the socially-approved target (17). Thus, it is not surprising that more women (including the normal-weighed) than men engage in weight control behaviors, as corroborated by the present findings. However, people not often realize the implicit social messages diffused in the mass media and its constant influence (17), believing that they are expressing their selves and conquering happiness and success when they are actually shaping their identities according to unrealistic ideals (18). As a result, appearance becomes central to individual's

identities, driving a normative pursuit of weight control (or thinness) in many individuals, as showed by the present results.

Mass media also explicitly instruct people on how to comply with these messages, by advertising a variety of "solutions" to get individuals closer to the cultural norms (17, 18). In fact, the growth of the weight management market in the last years, with new products (e.g., low-calorie foods and beverages, meal replacements, drugs, supplements) and services (e.g., dietary consultation, alternative therapies, commercial programs) targeting weight management emerging (19) might be reflected in the growing prevalence of weight loss attempts. Fortunately, results from chapters 2 and 3 suggest that weight control in the adult population worldwide is poorly linked with strategies which are not evidence-based and are potentially harmful (if maintained in the long term), with a low proportion of individuals reporting consuming weight management aids (e.g., pills or supplements, laxatives or diuretics) and using more extreme strategies (fasting or vomiting, and smoking). This is promising, since previous research has shown that these strategies may be associated with weight cycling and regain over time (20), and with eating disorders (21). Instead, weight control among adults appears to be more associated with health-promoting and evidence-based strategies, with most individuals reporting doing physical activity and moderating on calories to manage their weight. Also promising in terms of improving health are the consumption of healthy foods (e.g., fruits and vegetables) and the restriction of unhealthy foods (e.g., fatty and sugary foods), which were also frequently reported by these individuals. Actually, a higher importance attributed by the population to health in general may also be behind the increasing number of individuals trying to control weight in recent decades. Improving health and preventing future diseases, and improving wellbeing were the main reasons by which individuals engaged in weight loss and maintenance attempts.

Nevertheless, considering the findings from chapters 2 and 3, it seems that a considerable proportion of individuals with excess weight across the world are not doing anything to control their weight, possibly placing themselves at risk of further weight gain. On the one hand, scientific evidence shows that weight regain is highly prevalent among those initially successful at weight loss (22) and that recurrent unsuccessful weight control efforts may lead to a sense of learned helplessness and hopelessness, and consequently to skeptic and passive attitudes (23, 24). On the other hand, individuals may not realize what is a healthy weight for them and the advantages of achieving it or may have made a

conscious and informed decision about not losing weight, possibly because they value other aspects of their life and health more than weight per se.

The development of health-promoting behaviors is not easy, particularly when unhealthy behaviors already reflect long-standing habits. And this is influenced by many factors, including environmental, cultural, and socioeconomic factors. Individuals with higher socioeconomic status and higher levels of education have social advantages such as access to weight management services, health-related information, and higher affordability of healthy choices, which collectively facilitate the adoption of energy-balance related behaviors (25, 26), which could explain their increased likelihood of trying to control their weight (27, 28). This might reflect the higher prevalence of weight loss attempts found in Europe and North America, as shown in Chapter 2 (besides the well-known prevalence of overweight and obesity in these regions), and the higher prevalence of weight control attempts among more educated men, as shown in Chapter 3.

Collectively, these findings provide valuable insights into the public's response to the excess weight problem, suggesting that future public health initiatives aimed at promoting weight loss and its maintenance are likely to be welcomed by many individuals across the world, including in Portugal. Such initiatives should improve the extent to which individuals trying to control weight are aware of their excess weight while also informing all people (including the normal-weighed individuals) of the promises and the potential perils of attempting to change one's weight. This includes reinforcing the adoption and maintenance of evidence-based and healthy weight control strategies, and their potential of promoting and improving health, but also giving a reasonable account of the absence of widespread effective solutions, despite what the mass media insists on advertising. Generally, normal weight individuals should be encouraged to focus on maintaining weight rather than attempting to further reduce it. The strategies promoted within these initiatives should also be tailored according to gender – also considering men and women's preferences and habits - and context - considering potential socioeconomic and educational inequalities within population groups. Greater efforts must be made to promote weight loss and maintenance among those individuals who have excess weight but are not actively seeking weight control, by helping them understand the reasons behind their lack of action and overcome perceived barriers, and helping them reflect on the importance of seeking a healthy weight.

While obesity continues to tighten its grip on our society, policy makers and healthcare professionals should develop a better understanding of weight management

from the perspective of those actively seeking it, which they can consider when planning, developing and implementing general public health and specific obesity prevention and treatment initiatives. However, there is lack of health professionals who are critical in the context of weight management within the national healthcare systems, as seen in Portugal. For example, the number of nutritionists is 46% below the minimum desirable, according with recent public statements from the Portuguese Order of Nutritionists; and there are virtually no exercise professionals in primary health care, which is an obstacle to the planning, developing and implementation of such initiatives at a national/regional level. While governments discuss their national priorities, the development of brief obesity prevention and treatment initiatives at local levels and specific settings can be seen as an advantage and an opportunity for many individuals struggling with their weight, preventing them to achieve such risk levels. Considering the high public demand for weight management solutions and the consequent growth of the weight management market, it is critically important to rigorously evaluate the quality of the available services and products, especially commercial ones, and even more important, to fund research for- and promote evidence-based, safe and regulated weight management solutions.

To further increase our understanding of the public's response to the excess weight problem, it is essential to continue to gather data on this regard. Therefore, researchers are advised to monitor changes and trends worldwide, using internationally widespread, standardized, and validated instruments that will allow an accurate assessment of the weight control strategies used across populations and the reasons underlying weight control attempts, as well as the comparability of results. Future surveys should include such comprehensive tools for assessment, if the goal is to get a deeper understanding of the phenomenon of weight management across the world, and advance future practice.

…To achieving weight loss and maintenance

Understanding individual variability

To achieve and maintain behavior change is a complex process for individuals. It is difficult, resource-intensive, and time-consuming (29). Data from the Health Barometer illustrate that only half of the individuals who tried to change a negative health behavior were able to sustain that change (30). Maintaining weight control-related behaviors may be even more challenging since our society constantly pushes people to sedentary and highly-

caloric lifestyles. Nevertheless, it is possible for individuals to successfully reduce weight and maintain it in the long-run, as evidenced by results from chapters 4 and 5.

One key conclusion from Chapter 4, confirming findings from other weight control registries, such as the NWCR (6), is that there is no "one size fits all" approach for weight loss and maintenance. It is possible for different people to use a variety of different strategies for successful weight loss and maintenance, although some strategies appear to be particularly effective. For example, moderate-plus-vigorous physical activity was significantly associated with the magnitude of weight loss maintenance in these Portuguese successful weight loss maintainers. Indeed, the American College of Sports Medicine Position Stand on appropriate intervention strategies for weight loss and prevention of weight regain for adults recognizes that there is likely a dose effect of physical activity, with greater weight loss and enhanced prevention of weight regain with doses of 250 to 300 minutes per week of moderate-intensity physical activity (14). Nevertheless, while most successful weight-reduced individuals (both within the PWCR and the NWCR (31)) seem to require medium to high levels of moderate-plus-vigorous physical activity to maintain weight, others do not. This stresses the fact that the amount of physical activity necessary to achieve energy balance and a healthy weight is highly individual, besides the fact that it depends on energy intake. Actually, a very recent broad review on the role of physical activity in maintaining weight loss concluded that the need for extremely high levels of exercise for maintenance is yet to be confirmed in well-designed RCTs (32).

Other key strategies identified in Chapter 4 were also highlighted as particularly effective for managing weight in previous research with other populations of successful weight loss maintainers, including regular self-weighing (33, 34) and reducing carbohydrates in the diet (35). These findings are corroborated by systematic reviews and meta-analyses of randomized controlled trials showing the efficacy of these strategies, alone or in combination with other weight control strategies, for improving weight outcomes (36, 37). Interestingly, the use of weight loss supplements was negatively associated with the magnitude of weight loss maintenance in these successful individuals. There are at least two possible explanations for this finding: supplements might mitigate the usage of other healthier and more successful strategies; or individuals might start to use them when they experience weight gain. Regardless of these, a review of systematic reviews on the effectiveness of dietary supplements on body weight concluded that there is not good evidence for the effectiveness of such supplements without undue risks and thus such aids are not recommended (38).

Importantly, findings from Chapter 4 also emphasize gender-specific differences in what concerns successful weight control behaviors. Specifically, strategies such as reducing sugary foods for achieving weight loss and having healthy foods available at home and monitoring diet and physical activity for achieving maintenance were more consistently associated with success in women. In fact, several other studies have shown differences between men and women with respect to dietary and physical activity behaviors (e.g., (39)), suggesting that different psychological and socio-cultural factors might be involved.

Another consideration arising from Chapter 4 is that weight loss and maintenance seems to be a continuous behavior change process rather than a two-phase process. Habits formed during active weight loss seem to have continued into maintenance since most of the strategies highly used by these individuals to lose weight were also highly used to maintain weight loss (e.g., consuming vegetables). Indeed, three strategies that significantly correlated with weight loss were also significantly correlated with weight loss maintenance – namely, establishing specific goals regarding physical activity and eating behaviors, reducing the consumption of carbohydrates-rich foods and increasing the consumption of protein-rich foods – highlighting their importance in the process of weight loss and maintenance. This appears to provide support to the idea of a continuous process. However, the hypothesis that these individuals, who identify themselves as being weight loss maintainers, still wished to lose additional weight and, consequently, were still using those strategies, cannot be entirely excluded.

Findings from Chapter 5 point in the direction that psychological factors may have a primary role in this process of weight loss and maintenance, at least in women. For example, among women who achieved 3% and 5% long-term weight loss maintenance, a more positive body image was the strongest predictor (from the 28 potential behavioral and psychological predictors tested). This suggests that the more positive people are about their bodies, the easier it is to succeed in weight loss and maintenance, perhaps because when they appreciate their bodies, they start listening to their body's needs and making healthy choices (e.g., eating in a more healthful and balanced way), facilitating weight control (40). Actually, this group of women had a better profile in terms of other psychological and behavioral factors, somewhat confirming this assumption. These findings are in line with a recent systematic review suggesting psychological variables, including body image, as key predictors of weight loss and maintenance (13). Additionally, these findings also underline that successful weight loss maintenance depends on a number of factors, which

can interact. For example, among woman who achieved 3% and 5% long-term weight loss maintenance but had poor body image, having high exercise intrinsic motivation increased the likelihood of success. This means that experiencing enjoyment, genuine interest, and/or feeling positively challenged while exercising may favor exercise participation and other weight control-related behaviors, even when body image is poor, promoting weight loss maintenance.

These findings extend conclusions from previous chapters, contributing to a better understanding of the individual variability emerging in the process of weight loss and maintenance in both real life contexts and under controlled circumstances. They highlight the fact that there is no "silver bullet" for successful weight control and the importance of a long-term individualized approach, by suggesting that individuals, who desire to lose weight in a sustained way, are more likely to succeed if they implement a set of individualized key behavioral strategies that they are able to maintain for life. They also speak to the importance of targeting psychological factors underlying these individualized key behavioral strategies for long-term success. This information may be extremely useful to tailor optimal interventions for individuals and thus assume particular relevance for advancing the field of overweight and obesity treatment. Treatment and prevention programs (at both individual and population levels) should be designed to target combinations of evidence-based behavioral strategies, such as physical activity and weight self-monitoring (among others), that suit the target individuals' lifestyles better, while also being tailored for the characteristics of the individuals per se (e.g., according with gender). Additionally, these programs should target the improvement of body image and motivation quality, among other key psychological factors, as potential precursors of weight control-related behaviors, in order to increase success. The fact that body weight regulation seems to be influenced by a multiplicity of factors, including behavioral and psychological, reinforces the importance of a multidisciplinary approach in the treatment of overweight and obesity, including nutritionists, exercise physiologists, and psychologists, among others. Opportunities arising from new technologies (e.g., cellular-connected smart scales to monitor body weight or physical activity tracking devices) should also be considered, since it might facilitate the adoption and maintenance of the weight control-related behaviors. Such an approach will likely help people to lose weight in a lasting and sustainable way.

Promoting behavior change maintenance

Theoretical frameworks that specifically consider behavior maintenance can contribute to the understanding and long-lasting promotion of weight control-related behaviors, and consequently long-term weight loss maintenance (41). In this regard, one of the most prominent perspectives is SDT (41). As showed in chapters 2 and 3, individuals can start a weight loss attempt, or join a weight loss program, with different prevailing (or more salient) goals in mind. For instance, wanting to improve wellbeing and achieve long-term health and prevent future diseases (more intrinsic goals) – which were the most prevalent – or improving appearance and self-esteem (more extrinsic goals) – which were also relatively largely endorsed. Subsequently, the motivation associated with the course of action, such as the adoption of a specific behavior that contributes to weight loss (e.g., physical activity – which is particularly important for greater weight losses, as displayed in Chapter 4), can shift during the process and vary in the level of choicefulness and personal endorsement. For example, from an externally-driven (controlled) form of regulation (e.g. "because my doctor scared me by noting the severe health consequences if I don't do it"); to a partially internalized regulation (e.g., "I feel that I should do it because I am afraid that others think of me as a lazy person"); to more autonomous forms of regulation (e.g., "I want to be able to experience myself with energy"); all the way to intrinsic motivation (e.g., "I challenge myself and I really enjoy the process"). According to SDT, the satisfying experience of autonomy, competence, and relatedness while engaging in that specific behavior will foster the internalization process by reducing the psychological effort required for long-term behavioral regulation, resulting in psychological wellbeing and long-term weight loss maintenance (42).

Findings from Chapter 5 support SDT premises by showing that, from the 28 potential predictors included (within general and exercise motivation, psychological wellbeing and quality of life, eating behaviors and eating habits, and physical activity), exercise autonomous motivation emerged as the best predictor of at least 10% weight loss maintenance at 3 years. Moreover, women with high exercise-related autonomous motivation also showed greater psychological wellbeing, quality of life, and a more adaptive motivational profile (e.g., higher perceived choice and self-efficacy), suggesting a synergy between these features. An earlier longitudinal study from the same trial highlighted the importance of increasing autonomous motivation during treatment (1 year) for long-term physical activity participation (2 years), which mediated long-term (3 years) weight change (43). Findings from this chapter also emphasize that there may be

qualitatively different underlying motivational and cognitive predictors throughout the process of weight loss and maintenance since for lower weight losses the most effective predictors were different. Nevertheless, the second best predictor of at least 3% and 5% weight loss maintenance was exercise intrinsic motivation, underlying its importance in the process. Similarly, findings from Chapter 6 showed that intrinsic motivation was the most predictive variable for sustaining physical activity participation over time, particularly among women attempting to control their weight. Importantly, this relationship was observed over and above socioeconomic and physical environmental aspects.

Critical processes that are thought to positively influence the development of more self-determined motivation include an individual's exploration of personal and meaningful values, the incorporation of the change in behavior as part of identity change, the experience of behavior-related enjoyment, confidence, and ability, the adoption of positive and flexible behavioral patterns, reduced perception of obstacles, reduced value of and increased ability to deal with temptations, new synergies between behaviors, and the experience of connection and trust with important others (42).

For its role in energizing the direction and persistence of human behavior, motivation is clearly among the best candidates for predicting weight loss maintenance. As the present studies and other studies show (e.g., (44) (13)), not all types of motivation predict long-term and positive behavioral outcomes: more self-determined forms – intrinsic and autonomous motivation – seem to be the most effective. Therefore, targeting the motivational quality underlying weight-related behaviors seems to be more promising for helping individuals achieve weight loss maintenance. This can be promoted by creating more enjoyable contexts, helping individuals set their own valued and aspired goals (instead of imposing or promoting standard and socially-valued goals), exploring how goals can be accomplished in their daily living (i.e., focusing on their own behavioral targets), and identifying factors that encourage more autonomous reasons for changing the behaviors while supporting autonomous action (for example, by giving structured choice). Taking the example mentioned above – engaging in physical activity as a weight control behavior -, health professionals can emphasize the experience of the behavior itself by reducing the "instrumental" focus (i.e., as a means to achieve weight loss and maintenance) and encouraging individuals to explore a way to exercise that is fun and enjoyable, challenging yet personally valuable, and that fits in their lifestyle, therefore increasing the potential for long-term integration. The challenge is thus supporting a shift from "should/must/have to" motivation (i.e., simply comply with demands) to "want to"

motivation (i.e., accept the regulation for change as one's one) for adopting the weight control and other behaviors requiring self-regulation (45).

Limitations and future research directions

The methodological limitations of each study were separately addressed within the respective chapter. Thus, this section intends to describe more general methodological issues. Additionally, since some questions remained unanswered and others were raised throughout the conduction of the studies, some avenues for future research are proposed.

One important limitation of the studies presented in this thesis concerns the targeted populations. Specifically, studies presented in Chapter 5 and Chapter 6, which examined psychological predictors of weight loss maintenance and physical activity behavior, only included middle-aged women (premenopausal overweight and obese women seeking treatment and socioeconomically disadvantaged women, respectively). Therefore, it is unclear whether similar results will be observed in other groups of people, such as men. As we found in studies 2 (Chapter 3) and 3 (Chapter 4), there are specific gender-differences in weight control motivations and behaviors (e.g., women report more often body image-related reasons for trying to control weight, while men report more often physical condition-related reasons) and thus, is very possible that the psychological processes involved in weight loss and maintenance may also be different. Hence, the extent to which the present findings are generalizable (including the cut-off values of significant psychological determinants of successful long-term weight loss maintenance (Chapter 5)) remains to be determined. Future studies should explore these dynamics in men.

Additionally, study 3 (Chapter 4) included Portuguese adults successful at weight loss and maintenance who volunteer to participate in the Portuguese Weight Control Registry and, therefore, this sample may not be representative of the population of successful weight loss maintainers in Portugal, which would be ideal. In fact, the universe that this sample is intended to represent - successful maintainers *after* weight loss - is still to be determined. Ideally "success" should be assessed after one specific weight loss bout and representative surveys usually have the perspective of a person's entire lifetime and thus may include many weight loss attempts, some which were successful and some unsuccessful (3). Moreover, individuals who volunteer to participate in research studies are likely to be different from those that do not volunteer in a number of ways, including in

psychological characteristics that may influence weight control behaviors (46). Plans for the future include the continue effort to recruit participants so we can expand and add greater external validity to the current results.

Another limitation is that we made extensive use of self-reported measures throughout the studies, which are susceptible to response bias (e.g., associated with recall difficulties, social desirability or over- and underestimations). Nevertheless, many of the questionnaires used in this thesis are well validated and reliable, and whenever possible we also used objective measures (e.g., physical activity measured by accelerometry in study 3 (Chapter 4)). Additionally, in study 3 (Chapter 4), recruitment was also based on self-reported weight loss (with individuals providing the contact of a health professional, family member, or friend who could confirm their weight loss). While not ideal, and since medical records are not widely available in Portugal, there was not a better way to ensure accuracy in prior weight loss. Nevertheless, since this was not an intervention study and participants did not receive a financial or other major benefit from entering the registry, we believe there was little incentive for prospective participants to misreport their weight history.

Finally, the cross-sectional designs of studies 3 (Chapter 4) and 5 (Chapter 6) precluded from drawing firm conclusions about the causal direction of the associations, even though they had a retrospective and prospective nature, respectively. The possibility of an alternative causal ordering of the observed relations cannot be excluded and therefore results should only be interpreted as suggestive and supportive of the hypotheses that the significant retrospective and prospective correlates may indeed exert effects on the outcomes of interest.

Novel research is needed to continue to identify the personal strategies used by individuals during attempts at weight control, and the underlying motivations, as well as which behavioral and psychological factors can increase the chances of successful weight loss and maintenance among adults, in order to achieve success on a wider scale. For example, using ecologic momentary assessment, which minimize recall bias, maximize ecological validity and allow the study of the micro-processes that influence behavior in real-world contexts by comprising repeated sampling of individuals' current behaviors and experiences in real time and in their natural environments (47). A common matrix with which to evaluate the specific actions taken by individuals for the explicit purpose of attempting and achieving weight loss and maintenance should also be adopted in future studies, in order to provide more accurate data. Given the individual variability observed in

weight loss and maintenance (2), further exploration of the lifestyle factors associated with success, through profiling methodologies (e.g., cluster analyses or signal detection analyses), could be useful for tailoring future obesity prevention and treatment programs to the specific characteristics or profiles of individuals wishing to lose weight. Psychological predictors of other critical behaviors for weight loss maintenance, such as weight self-monitoring or eating behaviors, should also be analyzed in the future, in order to explore the process of weight loss and maintenance from different angles. Additionally, behavioral and psychological predictors of weight loss maintenance versus weight regain should be explored in order to identify the defining differences. This will contribute to the development of predictive models that have good validity and can be cross-culturally applied, guiding the development of more appropriate and long-term effective weight management programs.

Final Remark

I hope that the present findings will stimulate thought and debate amongst those who continue to engage in research and practice in the field of weight loss and maintenance, serving as a catalyst for more effective and satisfying processes, leading to more successful interventions and other initiatives both at the individual and population levels.

References

1. Butryn ML, Webb V, Wadden TA. Behavioral treatment of obesity. Psychiatr Clin North Am. 2011;34(4):841-859.
2. MacLean PS, Wing RR, Davidson T, Epstein L, Goodpaster B, Hall KD, et al. NIH working group report: Innovative research to improve maintenance of weight loss. Obes (Silver Spring). 2015;23(1):7-15.
3. Wing RR, Phelan S. Long-term weight loss maintenance. Am J Clin Nutr. 2005;82(1):222S-225S.
4. Vieira PN, Teixeira P, Sardinha LB, Santos T, Coutinho S, Mata J, et al. [Success in maintaining weight loss in Portugal: the Portuguese Weight Control Registry]. Cien Saude Colet. 2014;19(1):83-92.

5. Hartmann-Boyce J, Aveyard P, Koshiaris C, Jebb SA. Development of tools to study personal weight control strategies: OxFAB taxonomy. Obes (Silver Spring). 2016;24(2):314-320.
6. Ogden LG, Stroebele N, Wyatt HR, Catenacci VA, Peters JC, Stuht J, et al. Cluster analysis of the national weight control registry to identify distinct subgroups maintaining successful weight loss. Obes (Silver Spring). 2012;20(10):2039-2047.
7. Silva MN, Markland D, Minderico CS, Vieira PN, Castro MM, Coutinho SR, et al. A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight control: rationale and intervention description. BMC Public Health. 2008;8:234.
8. Silva MN, Vieira PN, Coutinho SR, Minderico CS, Matos MG, Sardinha LB, et al. Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. J Behav Med. 2010;33(2):110-122.
9. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol. 2000;55(1):68-78.
10. Deci EL, Ryan RM. *Intrinsic Motivation and Self-Determination in Human Behavior*. New York: Plenum Press; 1985.
11. Kiernan M, Moore SD, Schoffman DE, Lee K, King AC, Taylor CB, et al. Social support for healthy behaviors: scale psychometrics and prediction of weight loss among women in a behavioral program. Obes (Silver Spring). 2012;20(4):756-764.
12. Signal detection software for receiver operator characteristics. Available from: http://www.stanford.edu/~yesavage/ROC.html.
13. Teixeira PJ, Carraca EV, Marques MM, Rutter H, Oppert JM, De Bourdeaudhuij I, et al. Successful behavior change in obesity interventions in adults: a systematic review of self-regulation mediators. BMC Med. 2015;13:84.
14. Donnelly JE, Blair SN, Jakicic JM, Manore MM, Rankin JW, Smith BK. American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. Med Scie Sports Exerc. 2009;41(2):459-471.
15. World Health Organization. *Behaviour change strategies and health: the role of health systems. EUR/RC58/10.* Tbilisi, Georgia: World Health Organization; 2008.
16. Yaemsiri S, Slining MM, Agarwal SK. Perceived weight status, overweight diagnosis, and weight control among US adults: the NHANES 2003-2008 Study. Int J Obes. 2011;35(8):1063-1070.

17. Hesse-Biber S, Leavy P, Quinn CE, Zoino J. The mass marketing of disordered eating and eating disorders: The social psychology of women, thinness and culture. Women's Stud Int Forum. 2006;29:208-224.
18. Dittmar H. The costs of consumer culture and the "cage within": The impact of the material "good life" and "body perfect" ideals on individuals' identity and well-being. Psychol Inq. 2007;18:23-59.
19. Global weight loss & diet management products & services market (2010-2015) Available from: http://www.marketsandmarkets.com/Market-Reports/weight-loss-industry-224.html [Acessed October 2016].
20. Neumark-Sztainer D, Wall M, Story M, Standish AR. Dieting and unhealthy weight control behaviors during adolescence: associations with 10-year changes in body mass index. J Adolesc Health. 2012;50(1):80-86.
21. Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA. Shared risk and protective factors for overweight and disordered eating in adolescents. Am J Prev Med. 2007;33(5):359-369.
22. NoHoW Consortium. NoHoW: Evidence-based ICT tools for weight loss maintenance - Report on the demographic, socio-economic, geographic and ethnical pattern of weight loss. 2016.
23. Wooley SC, Garner DM. Obesity treatment: the high cost of false hope. J Am Diet Assoc. 1991;91(10):1248-1251.
24. Johnson CC, Myers L, Webber LS, Hunter SM. Learned helplessness with excess weight and other cardiovascular risk factors in children. Am J Health Behav. 1997;21(1):8.
25. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. Am J Prev Med. 2002;22(1):23-29.
26. Blane D. The life course, the social gradient and health. In: Marmot M, Wilkinson RG, editors. *Social determinants of health*. Oxford, UK: Oxford University Press; 2001. p. 64-80.
27. Wardle J, Griffith J. Socioeconomic status and weight control practices in British adults. J Epidemiol Community Health. 2001;55(3):185-190.
28. French SA, Jeffery RW, Forster JL, McGovern PG, Kelder SH, Baxter JE. Predictors of weight change over two years among a population of working adults: the Healthy Worker Project. Int J Obes Relat Metab Disord. 1994;18(3):145-154.

29. Butland B, Webb S, Kopelman P, McPherson K, Thomas S, Mardell J, et al. *Foresight Tackling Obesities: Future Choices - Project report, 2nd Edition*. Government Office for Science, 2007.
30. Edelman Health Barometer 2011. Available from: http://healthbarometer.edelman.com/2011/10/health-barometer-2011-global-findings/ [Acessed October 2016].
31. Catenacci VA, Ogden LG, Stuht J, Phelan S, Wing RR, Hill JO, et al. Physical activity patterns in the National Weight Control Registry. Obes. 2008;16(1):153-161.
32. Chin S-H, Kahathuduwa CN, Binks M. Physical activity and obesity: what we know and what we need to know. Obes Rev. 2016;17(12):1226-1244.
33. Feller S, Muller A, Mayr A, Engeli S, Hilbert A, de Zwaan M. What distinguishes weight loss maintainers of the German Weight Control Registry from the general population? Obes (Silver Spring). 2015;23(5):1112-1118.
34. Butryn ML, Phelan S, Hill JO, Wing RR. Consistent self-monitoring of weight: a key component of successful weight loss maintenance. Obes (Silver Spring). 2007;15(12):3091-3096.
35. Phelan S, Wyatt H, Nassery S, Dibello J, Fava JL, Hill JO, et al. Three-year weight change in successful weight losers who lost weight on a low-carbohydrate diet. Obes. 2007;15(10):2470-2477.
36. Madigan CD, Daley AJ, Lewis AL, Aveyard P, Jolly K. Is self-weighing an effective tool for weight loss: a systematic literature review and meta-analysis. Int J Behav Nutr Phys Act. 2015;12:104.
37. Hession M, Rolland C, Kulkarni U, Wise A, Broom J. Systematic review of randomized controlled trials of low-carbohydrate vs. low-fat/low-calorie diets in the management of obesity and its comorbidities. Obes Rev. 2009;10(1):36-50.
38. Onakpoya IJ, Wider B, Pittler MH, Ernst E. Food supplements for body weight reduction: a systematic review of systematic reviews. Obes (Silver Spring). 2011;19(2):239-244.
39. Kiefer I, Rathmanner T, Kunze M. Eating and dieting differences in men and women. J Men's Health & Gender. 2005;2(2):194-201.
40. Carraça EV, Silva MN, Teixeira PJ. Body image investment and self-regulation of weight control behaviors. In: Sams LB, Keels JA, editors. *Handbook on body*

image: Gender differences, sociocultural influences and health implications. Nova Science Pub Inc; 2013.

41. Kwasnicka D, Dombrowski SU, White M, Sniehotta F. Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. Health Psychol Rev. 2016;10(3):277-296.
42. Santos I, Silva MN, Teixeira PJ. A self-determination theory perspective on weight loss maintenance. Eur Health Psychol. 2016;18(5):194-199.
43. Silva MN, Markland D, Carraça EV, Vieira PN, Coutinho SR, Minderico CS, et al. Exercise autonomous motivation predicts 3-yr weight loss in women. Med Sci Sports Exerc. 2011;43(4):728-737.
44. Ng JY, Ntoumanis N, Thogersen-Ntoumani C, Deci EL, Ryan RM, Duda JL, et al. Self-Determination Theory Applied to Health Contexts: A Meta-Analysis. Perspect Psychol Sci. 2012;7(4):325-340.
45. Milyavskaya M, Inzlicht M, Hope N, Koestner R. Saying "no" to temptation: Want-to motivation improves self-regulation by reducing temptation rather than by increasing self-control. J Pers Soc Psychol. 2015;109(4):677-693.
46. Hennekens CH, Buring JE. *Epidemiology in medicine*. Boston: Little, Brown and Co.; 1987.
47. Shiffman S, Stone AA, Hufford MR. Ecological momentary assessment. Annu Rev Clin Psychol. 2008;4:1-32.

APPENDICES

Study I (Chapter 2) protocol

PROSPERO International prospective register of systematic reviews

Review title and timescale

1 Review title

Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.

Prevalence of personal weight control attempts in adults: a systematic review and meta-analysis

2 Original language title

For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

3 Anticipated or actual start date

Give the date when the systematic review commenced, or is expected to commence.

01/10/2014

4 Anticipated completion date

Give the date by which the review is expected to be completed.

31/01/2016

5 Stage of review at time of this submission

Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet started

Review stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	Yes
Data analysis	Yes	Yes

Provide any other relevant information about the stage of the review here.

Review team details

6 Named contact

The named contact acts as the guarantor for the accuracy of the information presented in the register record.

Dr Santos

7 Named contact email

Enter the electronic mail address of the named contact.

isantos@fmh.ulisboa.pt

8 Named contact address

Enter the full postal address for the named contact.

Faculty of Human Kinetics, University of Lisbon Estrada da Costa, Cruz Quebrada 1495-688 Cruz Quebrada

9 Named contact phone number

Enter the telephone number for the named contact, including international dialing code.

00351 214149290

10 Organisational affiliation of the review

Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

Interdisciplinary Centre for the Study of Human Performance, Faculty of Human Kinetics, University of Lisbon

Website address:
http://obesity.fmh.ulisboa.pt

11 Review team members and their organisational affiliations

Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

Title	First name	Last name	Affiliation
Dr	Inês	Santos	Interdisciplinary Centre for the Study of Human Performance, Faculty of Human Kinetics, University of Lisbon
Professor	Falko	Sniehotta	The Centre for Translational Research in Public Health, Institute of Health & Society, Faculty of Medical Sciences, Newcastle University
Professor	Eliana	Carraça	Interdisciplinary Centre for the Study of Human Performance, Faculty of Human Kinetics, University of Lisbon
Dr	Marta	Marques	Interdisciplinary Centre for the Study of Human Performance, Faculty of Human Kinetics, University of Lisbon
Professor	Pedro	Teixeira	Interdisciplinary Centre for the Study of Human Performance, Faculty of Human Kinetics, University of Lisbon

12 Funding sources/sponsors

Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

This review was funded by the Portuguese Science and Technology Foundation (grant number SFRH/BD/80739/2011 attributed to Inês Santos)

13 Conflicts of interest

List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

Are there any actual or potential conflicts of interest?

None known

14 Collaborators

Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

Title	First name	Last name	Organisation details

Review methods

15 Review question(s)

State the question(s) to be addressed / review objectives. Please complete a separate box for each question.

What is the prevalence of weight control attempts in adults around the world?

What are the correlates (e.g., demographic, age, gender) of weight control attempts in adults?

Which are the most prevalent strategies reported by adults attempting to lose or maintain weight?

What are the self-reported reasons underlying weight control attempts?

16 Searches

Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

A comprehensive search of published articles was conducted on the following electronic databases: PubMed, PsycINFO, and Web of Science. Additionally, manual cross-referencing of retrieved articles and hand-searches of key scientific journals was performed. There were no restrictions regarding the language of publication.

17 **URL to search strategy**

If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

I give permission for this file to be made publicly available

Yes

18 **Condition or domain being studied**

Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.

A large proportion of adults around the world report that they are trying to lose or maintain weight, with the most frequently used strategies being the reduction of calorie intake and the increase of physical activity, in very individual patterns. Given the rising prevalence of obesity and the increasing emphasis on weight gain prevention, a better understanding of weight control behaviors will be useful for the promotion of more effective weight management practices in adult populations, to prevent psychological suffering derived from fruitless attempts, to better allocate resources, and to direct public health policies towards healthier practices.

19 **Participants/population**

Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.

Inclusion criteria: Samples of adults (>18yr) Exclusion criteria: Pregnancy, athletes and populations with specific health conditions, disabilities or mental disorders.

20 **Intervention(s), exposure(s)**

Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed

Not applicable.

21 **Comparator(s)/control**

Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).

Not applicable.

22 **Types of study to be included**

Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.

Only epidemiological/observational studies were included.

23 **Context**

Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

24 **Primary outcome(s)**

Give the most important outcomes.

Prevalence of weight control (weight loss and/or maintenance) attempts

Correlates of weight control attempts

Give information on timing and effect measures, as appropriate.

25 **Secondary outcomes**

List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.

Weight control strategies

Weight control motives

Give information on timing and effect measures, as appropriate.

26 **Data extraction (selection and coding)**

Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

First, one researcher identified potentially eligible studies based on title, abstract and references, and determined which manuscripts required a full-text review based on pre-specified inclusion/exclusion criteria. After full-text screening of 176 studies, 72 met the eligibility criteria for entering the review. The Joanna Briggs Institute data extraction form for prevalence and incidence studies was used to extract relevant information. Two of three researchers independently coded and extracted the relevant information to be included in systematic review summary tables.

27 **Risk of bias (quality) assessment**

State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

The methodological quality of included studies was assessed using a standardized form based on a short version of The Joanna Briggs Institute critical appraisal checklist for studies reporting prevalence data, consisting of a 5-category tool addressing critical issues of internal and external validity of prevalence data, including 1) representativeness of the sample, 2) appropriate recruitment of study participants, 3) adequacy of sample size, 4) non-response and refusals, and 5) use of a standard criteria for the measurement of the condition. For each study, each category of the checklist was classified as Yes, No, Unclear or Not applicable. Two of three researches independently assessed the methodological quality of each study and discussed the results of their critical appraisals. Disagreements were resolved by consensus.

28 **Strategy for data synthesis**

Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

First we will describe the characteristics of included studies. Data will be qualitatively synthetized by outcome measure and presented in tabular form. Further quantitative analyses (meta-analyses) will be conducted if applicable. Sensitivity analyses will be carried out to explore if results are affected by studies with poor quality, unpublished studies and if possible examine how consistent results are across various subgroups.

29 **Analysis of subgroups or subsets**

Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.

None planned.

Review general information

30 **Type and method of review**

Select the type of review and the review method from the drop down list.

Epidemiologic, Systematic review

31 **Language**

Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.

English

Will a summary/abstract be made available in English?

Yes

32 **Country**

Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.

England, Portugal

33 **Other registration details**

Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.

34 **Reference and/or URL for published protocol**

Give the citation for the published protocol, if there is one.

Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

I give permission for this file to be made publicly available

Yes

35 Dissemination plans

Give brief details of plans for communicating essential messages from the review to the appropriate audiences.

We intend to publish the systematic review in a peer-reviewed journal relevant in the obesity field.

Do you intend to publish the review on completion?

Yes

36 Keywords

Give words or phrases that best describe the review. (One word per box, create a new box for each term)

Weight control attempts
Successful weight control
Strategies
Prevalence
Correlates
Motives

37 Details of any existing review of the same topic by the same authors

Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

38 Current review status

Review status should be updated when the review is completed and when it is published.

Completed and published
30/09/2016

39 Any additional information

Provide any further information the review team consider relevant to the registration of the review.

40 Details of final report/publication(s)

This field should be left empty until details of the completed review are available. Give the full citation for the final report or publication of the systematic review.
Give the URL where available.

APPENDICES

Other articles related to the thesis

Perfil comportamental de adultos portugueses com sucesso na manutenção do peso perdido: o Registo Nacional de Controlo do Peso[8]

[8] **Santos I**, Vieira PN, Teixeira PJ. (2014). Perfil comportamental de adultos portugueses com sucesso na manutenção do peso perdido: o Registo Nacional de Controlo do Peso. Revista Factores de Risco, 34:50-55.

Resumo

Dada a dificuldade sentida por milhares de pessoas em perder peso de forma sustentada no tempo, é importante conhecer as características daquelas que comprovadamente o conseguem. O Registo Nacional de Controlo do Peso, atualmente com 372 participantes, é um estudo pioneiro em Portugal que identifica as estratégias utilizadas por adultos com sucesso na manutenção do peso perdido. Os resultados mais recentes deste estudo indicam que não existem diferenças comportamentais marcadas entre a perda e a manutenção do peso no que respeita às estratégias alimentares utilizadas, destacando-se ter alimentos saudáveis em casa, tomar o pequeno-almoço e consumir produtos hortícolas regularmente. A monitorização regular do peso é uma estratégia usada por cerca de 75% das pessoas durante a perda de peso. Por outro lado, a prática regular de atividade física encontra-se entre as estratégias mais usadas após a perda de peso (67% dos participantes), embora a quantidade de atividade física reportada seja muito variável. Este estudo comprova que é possível perder peso de forma estável em Portugal e sugere caminhos para atingir o atingir. Contudo, a fórmula para o sucesso parece ser razoavelmente individualizada.

Palavras-chave: Obesidade; Manutenção do peso; Comportamentos; Estratégias

Introdução

A obesidade é reconhecida como um problema de saúde pública emergente e o seu tratamento constitui um grande desafio a nível mundial[1]. Muitas pessoas com obesidade que tentam perder peso conseguem fazê-lo[2]. Contudo, manter o peso perdido no longo prazo continua a ser o "calcanhar de Aquiles" nas intervenções comportamentais de gestão do peso: o peso perdido é geralmente recuperado no espaço de 3 a 5 anos[3,4].

A literatura sugere que aproximadamente 20% dos indivíduos com excesso ponderal consegue manter o peso perdido a longo prazo quando são definidas metas satisfatórias, nomeadamente, a perda de 10% do peso corporal[5], o que já acarreta melhorias substanciais nos fatores de risco para a diabetes e doença cardiovascular[6]. No entanto, pessoas diferentes atingem o sucesso na manutenção do peso perdido de formas diferentes[7] e vários comportamentos têm sido identificados como sendo comuns nas pessoas que tiveram sucesso na manutenção do peso a longo prazo, incluindo: fazer uma alimentação hipocalórica e hipolipídica, tomar o pequeno-almoço regularmente, manter um padrão alimentar consistente nos dias de semana e no fim-de-semana, monitorizar o peso corporal, manter registos alimentares, ver menos de 10h de televisão por semana e praticar atividade física de forma regular[8,9].

Visto que a manutenção do peso perdido é crucial para sustentar os benefícios para a saúde, compreender as alterações do estilo de vida que levam as pessoas a conseguir perder peso de forma sustentada no tempo é fundamental para controlar a epidemia da obesidade e as suas consequências. Dado o sucesso na manutenção do peso perdido a longo prazo atingido pelos participantes do Registo Nacional de Controlo do Peso (RNCP), o conhecimento dos seus comportamentos é um pré-requisito importante para se poder ajudar mais portugueses a manter o peso perdido.

O Registo Nacional de Controlo do Peso

O RNCP surgiu no seguimento do *National Weight Control Registry* (NWCR), o maior estudo Norte-Americano que explora as características de indivíduos com sucesso na perda e manutenção do peso a longo prazo[10], no sentido de responder a duas questões importantes no que respeita ao controlo do peso em Portugal: há indivíduos portugueses com sucesso na manutenção do peso perdido? Que características psicológicas e

comportamentais conduziram estes indivíduos ao sucesso? O RNCP consiste assim num registo nacional voluntário de pessoas adultas com sucesso na redução e manutenção do peso a longo prazo, nomeadamente, que nos últimos 15 anos (e durante a idade adulta), tenham perdido pelo menos 5 kg de forma intencional e que tenham conseguido manter essa perda de peso durante, pelo menos, 1 ano.

Os participantes são recrutados através da divulgação do RNCP por parte dos diferentes meios de comunicação: imprensa escrita, rádios, televisão, redes sociais e *websites*, incluindo o do RNCP (www.registodopeso.net). Os interessados efetuam a pré-inscrição por *e-mail* ou telefone, preenchendo de seguida um breve questionário (enviado e recebido via *e-mail*), que inclui informação pessoal e informação relativa à história do peso, a partir do qual são verificados os critérios de inclusão no estudo. Os indivíduos que preenchem os requisitos para participação no estudo e que aceitam participar, são convidados a dirigir-se ao Laboratório de Exercício e Saúde da Faculdade de Motricidade Humana, Universidade de Lisboa, em dia previamente agendado, para se proceder à sua avaliação. A participação no RNCP implica dois momentos de avaliação: um momento inicial e outro após um ano de entrada no estudo, permitindo o acompanhamento prospetivo dos participantes no que respeita ao peso, hábitos e comportamentos, e a possibilidade de se testar o efeito das variáveis como possíveis preditores da manutenção do peso a longo prazo. As avaliações contemplam o preenchimento de um questionário principal (que inclui informação sociodemográfica, detalhes sobre a história do peso e as estratégias de perda e manutenção do peso), o preenchimento de uma bateria de questionários psicométricos (com inúmeras variáveis psicossociais), avaliação da alimentação e da atividade física e ainda avaliação antropométrica (peso, altura e perímetro de cintura). As avaliações são realizadas por técnicos treinados para o efeito e de acordo com um protocolo uniformizado. Antes do primeiro momento de avaliação, todos os participantes assinam um consentimento informado livre e esclarecido.

A participação no RNCP está aberta em permanência. O RNCP é o primeiro estudo desta natureza a ser realizado em Portugal, e desde 2008 tem atraído continuamente mais participantes, contando atualmente com cerca de 372 participantes. É importante salientar que se o RNCP tivesse o mesmo número de participantes que o seu congénere americano - proporcionalmente ao número aproximado de indivíduos adultos com obesidade no país -, seriam necessários apenas 63 participantes.

Características dos portugueses com sucesso na manutenção do peso perdido

A média de idades dos participantes do RNCP é de 39 anos. A maioria são casados ou vivem em união de facto (55%), têm habilitações literárias superiores (69%) e estão empregados (80%). Não se observaram diferenças significativas entre géneros no que respeita às variáveis demográficas. No que diz respeito à história do peso dos participantes (Tabela 1), o peso máximo atingido foi, em média, 91 kg. Apesar da perda de peso mínima requerida para participarem no estudo ser de 5 kg, observou-se uma grande variabilidade interindividual e muitos participantes ultrapassaram este valor: a média de perda de peso foi de 19,1 kg, o que corresponde a uma redução ponderal de 20%. Isto significa que muitos participantes alteraram substancialmente o seu Índice de Massa Corporal (IMC). De facto, comparando as categorias de IMC antes e após a perda de peso, observa-se uma diminuição do número de pessoas com obesidade (de 67% para 20%) e um consequente aumento do número de pessoas com pré-obesidade (de 24% para 42%) e peso normal (de 9% para 39%). Mesmo os indivíduos que continuaram classificados como tendo obesidade (IMC $\geq$ 30 kg/m^2) conseguiram perder, em média, 20 kg (18% do peso corporal) (nota: dados não apresentados na Tabela 1). A duração da manutenção do peso perdido reportada pelos participantes foi de, aproximadamente, 28 meses.

Tabela 1. História do peso no RNCP

	Mulheres (n=136)	Homens (n=88)
Peso máximo (kg)***	85,7 ± 16,5	105,8 ± 19,2
IMC máximo (kg/m^2)*	32,5 ± 6,5	34,8 ± 5,9
Peso atual (kg)***	69,2 ± 11,8	82,3 ± 11,5
IMC atual (kg/m^2)	26,3 ± 4,5	27,3 ± 3,6
Perda de peso (kg)**	16,4 ± 10,7	23,1 ± 14,0
Manutenção do peso (meses)	28,6 ± 26,8	27,3 ± 25,0

Nota: Valores expressos em média ± d.p.

***p < 0,001; **p < 0,01; *p < 0,05 (Teste t para amostras independentes)

Ingestão nutricional e atividade física no RNCP

Os participantes reportaram uma média de ingestão de cerca de 2200 kcal por dia, sendo cerca de 20% da energia proveniente de proteínas, 48% proveniente de hidratos de carbono e 33% proveniente de gordura (Tabela 2). Os açúcares contribuíram com 23% para o valor calórico total diário e a fibra com 31%. Considerando os valores de ingestão de referência – *Dietary References Intakes* – do *Institute of Medicine*[12] (10-35% de proteína, 45-65% de hidratos de carbono e 20-35% de gordura) os participantes apresentaram uma ingestão de macronutrientes adequada.

Relativamente à atividade física, observou-se uma grande variabilidade na participação em atividades moderadas-a-vigorosas reportadas pelos participantes, variando de 20 min/semana a 1260 min/semana (média: 285 ± 246 min/semana). Cerca de 35% dos participantes realizaram menos de 150 min/semana, ao passo que 44% realizaram mais de 300 min/semana (Figura 1). O valor médio de atividade física de intensidade moderada-a-vigorosa praticado pelos participantes vai de encontro às recomendações de atividade física para a gestão do peso do *American College of Sports Medicine*[14].

Não se observaram diferenças significativas entre géneros na ingestão nutricional nem na atividade física realizada pelos participantes.

Tabela 2. Ingestão nutricional no RNCP

	Mulheres (n=136)	Homens (n=88)
Energia (kcal/dia)	2125 ± 835	2362 ± 865
Proteína (% kcal/dia)	19,8 ± 3,7	19,4 ± 3,4
Hidratos de Carbono (% kcal/dia)	48,2 ± 8,8	47,6 ± 7,3
Açúcares (% kcal/dia)	23,2 ± 6,8	22,8 ± 6,7
Fibra alimentar (% kcal/dia)	29,9 ± 12,4	31,9 ± 15,6
Gordura total (% kcal/dia)	33,5 ± 7,1	33,3 ± 5,3

Nota: Valores expressos em média ± d.p.

Instrumento de avaliação: Questionário de Frequência Alimentar[11].

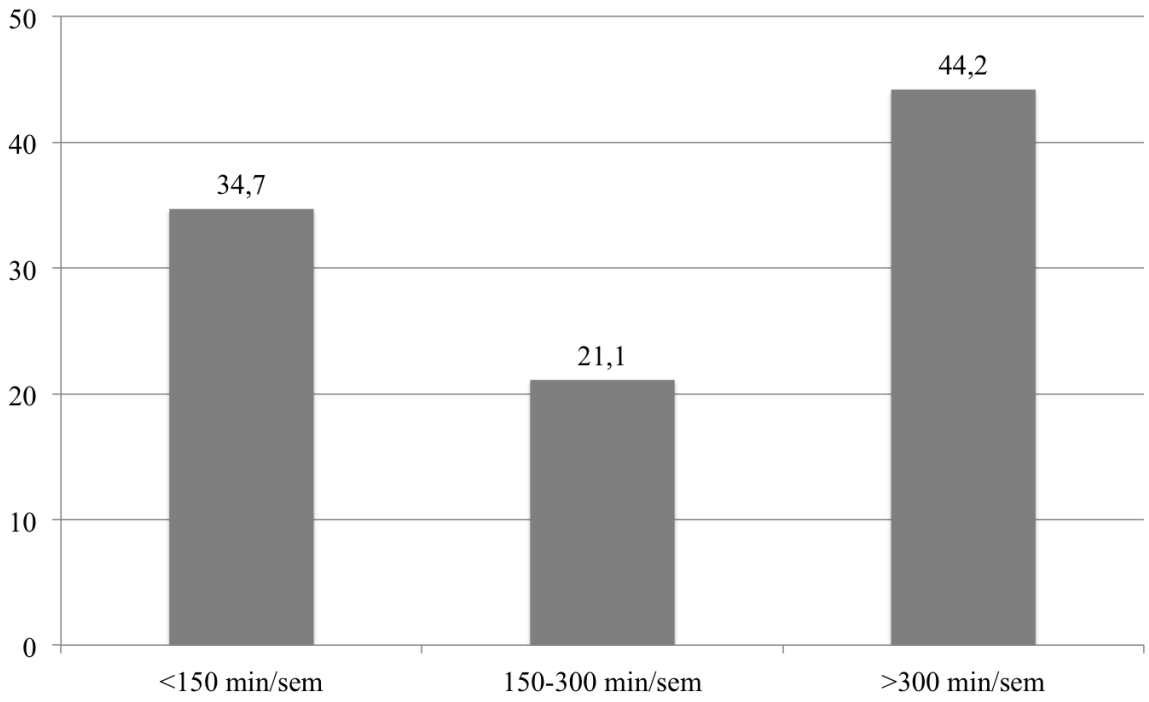


Figura 1. Minutos de atividade física moderada-a-vigorosa por semana.

Nota: Valores expressos em percentagem. Instrumento de avaliação: *Paffenbarger Physical Activity Questionnaire*[13].

Estratégias comportamentais utilizadas no RNCP

A estratégia comportamental mais frequentemente adotada pelos participantes do RNCP, tanto com vista à perda de peso como à manutenção do peso, foi ter em casa alimentos mais saudáveis (Tabela 3). O consumo regular de produtos hortícolas nas refeições principais, o consumo regular de pequeno-almoço, a redução da quantidade de alimentos com açúcar e gordura, a redução de gordura na confecção das refeições e selecionar de forma consciente os alimentos foram outras estratégias utilizadas por mais de 80% dos participantes com vista a gerir o peso. O consumo de alimentos com elevado teor de fibra e a inclusão de pequenas merendas a meio da manhã e da tarde também foram utilizadas por mais de 80% dos participantes na tentativa de manter o peso. Por outro lado, estratégias como reduzir ou excluir a ingestão de hidratos de carbono, consumir alimentos ricos em proteína, registar a ingestão alimentar e a atividade física, contabilizar as calorias das refeições, diminuir a ida a restaurantes, utilizar escadas em vez de elevadores, caminhar em substituição da utilização de transportes, fazer pausas ativas no trabalho e

estacionar o carro em locais distantes foram utilizadas com o propósito de perder ou manter o peso por menos de 40% dos participantes (nota: não assinalado na Tabela 3).

Algumas estratégias foram significativamente mais prevalentes nas mulheres, nomeadamente a redução de gordura na confecção das refeições e fazer pausas ativas no trabalho na tentativa de perderem peso, e optar por consumir pequenas porções e a inclusão de pequenas merendas a meio da manhã e da tarde na tentativa de manterem o peso (comparativamente com os homens; teste qui-quadrado: $p < 0,05$). Por outro lado, uma maior proporção de homens optou por monitorizar o peso e estabelecer objetivos concretos no processo de perda de peso, e por praticar atividade física de forma regular e fazer registos da alimentação e da atividade física no processo de manutenção do peso, comparativamente com as mulheres (teste qui-quadrado: $p < 0,05$).

Os participantes do RNCP reportaram fazer em média cinco refeições diárias (mulheres 5,5 ± 1,1 e homens 5,2 ± 1,3; teste t para amostras independentes: $p = 0,011$) e fazer duas refeições por semana em restaurantes (mulheres 2,0 ± 2,1 e homens 2,8 ± 2,5; teste t para amostras independentes: $p = 0,002$).

Conclusão

O RNCP é um estudo pioneiro em Portugal, permitindo identificar em simultâneo os hábitos alimentares e de atividade física e as estratégias comportamentais que aparentam contribuir para a perda e manutenção do peso a longo prazo dos adultos portugueses.

Os resultados mais recentes indicam que o sucesso na perda e manutenção do peso perdido pode ser atingido com diferentes níveis de ingestão calórica e de atividade física e também com uma grande diversidade de estratégias do foro comportamental, que variam a nível individual. Por exemplo, um grupo considerável de participantes conseguiu perder e manter o peso perdido praticando menos de 150 minutos de atividade física de intensidade moderada-a-vigorosa, o que reforça o facto de que a quantidade de atividade física necessária para atingir o equilíbrio energético e um peso saudável depende também da ingestão energética[15]. Isto sugere que não existe uma abordagem ideal que sirva da mesma forma para todos os indivíduos, pelo que cabe a cada um identificar as estratégias comportamentais que melhor funcionam consigo e que mais facilmente se adaptam ao seu quotidiano, no sentido de gerirem o peso a longo prazo. É ainda importante notar que as

Tabela 3. Estratégias comportamentais utilizadas no RNCP

Estratégias	Participantes (%)
Perda de peso	
Ter alimentos saudáveis em casa	92,4
Consumir saladas/legumes	89,6
Tomar o pequeno-almoço regularmente	89,4
Reduzir alimentos com gordura	86,7
Reduzir alimentos com açúcar	86,1
Reduzir a gordura nas refeições/confecções/temperos	83,9
Selecionar conscientemente os alimentos	80,1
Escolher pequenas porções	78,5
Incluir *snacks* a meio da manhã/tarde	78,2
Consumir alimentos ricos em fibra	77,9
Monitorizar o peso*	74,5
Substituir molhos por alternativas menos calóricas	65,4
Estabelecer objetivos concretos	60,5
Receber orientação de um especialista	56,1
Consumir sopa	50,5
Manutenção do peso perdido	
Ter alimentos saudáveis em casa	96,5
Tomar o pequeno-almoço regularmente	96,5
Consumir saladas/legumes	88,6
Reduzir alimentos com gordura	85,9
Reduzir alimentos com açúcar	84,0
Consumir alimentos ricos em fibra	83,2
Reduzir a gordura nas refeições/confecções/temperos	82,8
Incluir *snacks* a meio da manhã/tarde	80,0
Realizar refeições em intervalos regulares**	74,3
Selecionar conscientemente os alimentos	72,3
Substituir molhos por alternativas menos calóricas	69,0
Praticar atividade física regularmente**	67,2
Escolher pequenas porções	65,2
Consumir sopa	50,3

Nota: Os valores correspondem às respostas "sempre" e "muitas vezes" para cada uma das estratégias indicadas. *Estratégia avaliada apenas para a perda de peso; **Estratégia avaliada apenas para a manutenção do peso.

estratégias utilizadas com vista à perda e manutenção do peso perdido foram sensivelmente as mesmas, sugerindo que a gestão do peso envolve um processo contínuo de mudança comportamental, não contendo duas fases distintas com alterações específicas dos hábitos do estilo de vida. Finalmente, salientam-se alguns comportamentos como sendo os mais consistentes e que parecem aumentar a probabilidade de sucesso no que concerne à perda e manutenção do peso a longo prazo: adotar uma alimentação normocalórica, com um consumo regular de pequeno almoço e de produtos hortícolas, uma frequência de cinco refeições por dia e tendo constantemente alimentos salutares disponíveis em casa; e praticar atividade física de intensidade moderada-a-vigorosa de forma regular, de preferência mais de 150 minutos por semana.

Os resultados do RNCP contribuem claramente para o conhecimento científico na área da obesidade, revelando que, em Portugal, é possível perder e manter o peso no longo prazo. No futuro próximo, a participação de um maior número de pessoas no Registo e uma descrição mais detalhada das suas características contribuirão certamente para ajudar todos os que pretendem perder peso de forma sustentada.

Bibliografia

1. WHO European Charter on counteracting obesity. WHO European Ministerial Conference on Counteracting Obesity: Diet and physical activity for health. *Istanbul, Turkey*: World Health Organization; 2006.
2. Wing RR, Hill JO. Successful weight loss maintenance. Annu Rev Nutr. 2001;21:323-41.
3. Stevens J, Truesdale KP, McClain JE, Cai J. The definition of weight maintenance. Int J Obes. 2006;30(3):391-99.
4. Wadden TA, Phelan S. Behavioral assessment of the obese patient. In: Wadden TA, Stunkard AJ, editors. Handbook of obesity treatment. New York: Guilford Press; 2002. p. 186-226.
5. McGuire MT, Wing RR, Hill JO. The prevalence of weight loss maintenance among American adults. Int J Obes. 1999;23(12):1314-9.
6. Jensen MD, Ryan DH, Apovian CM, Loria CM, Ard JD, Millen BE, et al. 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults: A Report of the American College of Cardiology/American Heart

Association Task Force on Practice Guidelines and The Obesity Society. J Am Coll Cardiol. 2013.

7. Ogden LG, Stroebele N, Wyatt HR, Catenacci VA, Peters JC, Stuht J, et al. Cluster analysis of the national weight control registry to identify distinct subgroups maintaining successful weight loss. Obes. 2012;20(10):2039-47.
8. Wing RR, Phelan S. Long-term weight loss maintenance. Am J Clin Nutr. 2005;82(1 Suppl).
9. Stubbs J, Whybrow S, Teixeira P, Blundell J, Lawton C, Westenhoefer J, et al. Problems in identifying predictors and correlates of weight loss and maintenance: implications for weight control therapies based on behaviour change. Obes Rev. 2011;12(9):688-708.
10. Klem ML, Wing RR, McGuire MT, Seagle HM, Hill JO. A descriptive study of individuals successful at long-term maintenance of substancial weight loss. Am J Clin Nutr. 1997;66(2):239-46.
11. Lopes C. Reprodutibilidade e validação de um questionário semi-quantitativo de frequência alimentar. In: Alimentação e enfarte agudo do miocárdio: um estudo caso-controlo de base populacional [Tese de Doutoramento]. Porto: Universidade do Porto; 2000.
12. Institute of Medicine. Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids. Washington D.C.: The National Academies Press; 2005.
13. A collection of physical activity questionnaires for health-related research: Paffenbarger Physical Activity Questionnaire. Med Sci Sports Exerc. 1997;29:83-88.
14. Donnelly JE, Blair SN, Jakicic JM, Manore MM, Rankin JW, Smith BK. American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. Med Scie Sports Exerc. 2009;41(2):459-71.
15. Teixeira PJ, Stubbs RJ, King NA, Whybrow S, Blundel JE. Obesity. In: Saxton JM, editor. Exercise and Chronic Disease: An Evidence-Based Approach. London: Routledge; 2011.

A self-determination theory perspective on weight loss maintenance[9]

[9] Santos I, Silva MN, Teixeira PJ. (2016). A self-determination theory perspective on weight loss maintenance. The European Health Psychologist, 18(5):194-199.

Weight loss maintenance is a major challenge for obesity care. The success rate of previously overweight/obese individuals when trying to maintain weight loss is low and regaining weight is the most common result (Wing & Phelan, 2005). At the heart of this problem lies an interaction between human biology and the current environment, which, for many individuals, translates into physical activity and eating patterns that favor weight gain and regain (MacLean et al., 2015). This said, individual reasons for weight management attempts vary considerably and there is both theoretical and empirical support for investigating whether motivational processes underlying behavioral regulation help explain part of the success and failure in obesity management (Teixeira, Silva, Mata, Palmeira, & Markland, 2012).

A recent systematic review on theoretical explanations for behavior change maintenance identified five interconnected themes reflecting theoretical explanations about how individuals maintain initial behavior changes over time (Kwasnicka, Dombrowski, White, & Sniehotta, 2016). One of these themes focused on maintenance *motives*, which are hypothesized to facilitate behavior change maintenance by enabling specific satisfaction-related outcomes derived from engaging in the new behavior. Among other features, one difference between initiation and maintenance motives could lie on the level of *self-determination* experienced by individuals, something that often develops after initiating the new behavior. From the perspective of self-determination theory (SDT; Deci & Ryan, 2008), this article explores motivation-related processes viewed as necessary for the persistence of weight management-related behaviors over time.

Self-determination, commonly referred to as autonomy, is related to the perceived origin of one's behavior or its (internal) *locus of causality* – that is, the extent to which a behavior is adopted with a sense of choice and self-endorsement. According to SDT (Deci & Ryan, 2008; Ryan & Deci, 2000), having the psychological need for *autonomy* satisfied, together with the need for *competence* (i.e., an individuals' need to feel a sense of mastery and capacity to accomplish the behavior) and *relatedness* with others (i.e., an individuals' need to feel meaningfully connected to others, valued and understood) energizes autonomous motivation, promoting behavioral persistence and well-being (Deci & Ryan, 2000). In turn, when these three needs are thwarted, people will tend to develop controlled motivations, regulating their behavior based on external contingencies and internalized self-judgments (Vansteenkiste & Ryan, 2013). Evidence from several domains supports the theoretical premise that different motivational regulatory processes underlying goal pursuit are differentially associated with behavioral outcomes and wellbeing. Importantly,

it suggests that *maintaining* certain behaviors over time (which is crucial for weight management) requires that the individual internalizes and integrates values and skills for change, and experience self-determination (Ng et al., 2012; Teixeira, Carraca, Markland, Silva, & Ryan, 2012).

Recent developments in the theory show that not only regulatory processes can be different (as a result of need satisfaction vs. frustration), but also that "not all goals are created equal" (Vansteenkiste, Niemiec, & Soenens, 2010). In brief, the outcomes that individuals are pursuing through the new behavior – i.e., the *content* of individuals' goals or aspirations – can have intrinsic or extrinsic qualities, which can also influence behavior maintenance. Relative to "extrinsic goals" (e.g., wealth, social recognition, physical attractiveness), "intrinsic" goals (e.g., health, personal growth, social connectedness) tend to be regulated by more self-determined forms of behavioral regulation and are thought to result in improved self-regulation and longer-term outcomes (Ingledew & Markland, 2009; Kasser & Ryan, 1996).

In respect to *weight loss maintenance*, individuals can start a weight loss attempt, or join a weight loss program, with different prevailing goals in mind. For instance, wanting to improve some aspect of their health (a more intrinsic goal) or improving appearance (a more extrinsic goal). Subsequently, the motivation associated with the course of action, such as the adoption of a specific behavior that contributes to weight loss (e.g., physical activity), can shift during the process and vary in the level of choicefulness and personal endorsement. For example, from an externally-driven (controlled) form of regulation (e.g. "because my doctor scared me by noting the severe health consequences if I don't do it"); to a partially internalized regulation (e.g., "I feel that I should do it because I am afraid that others think of me as a lazy person"); to more autonomous forms of regulation (e.g., "I want to be able to experience myself with energy"); all the way to intrinsic motivation (e.g., "I challenge myself and I really enjoy the process"). The notion of 'prevailing goal' is important to note here, since people commonly have multiple goals associated with a single behavior.

According to SDT, the satisfying experience of autonomy, competence, and relatedness while engaging in that specific behavior will foster the internalization process by reducing the psychological effort required for long-term behavioral regulation, resulting in psychological wellbeing and long-term weight loss maintenance. In the Figure, we describe critical processes thought to be associated with successful internalization. These include an individual's exploration of personal and meaningful values; the incorporation of

the change in behavior as part of identity change ("I am a vital and healthy person, and my physical activity and eating patterns reflect that"); the experience of behavior-related enjoyment, confidence, and ability ("while exercising I feel tension-free, happy, energetic and capable. I feel powerful!"); the adoption of positive and flexible behavioral patterns ("I know that sometimes I cannot go to the gym so during these periods I try to walk more"); and the experience of connection and trust with important others, among others.

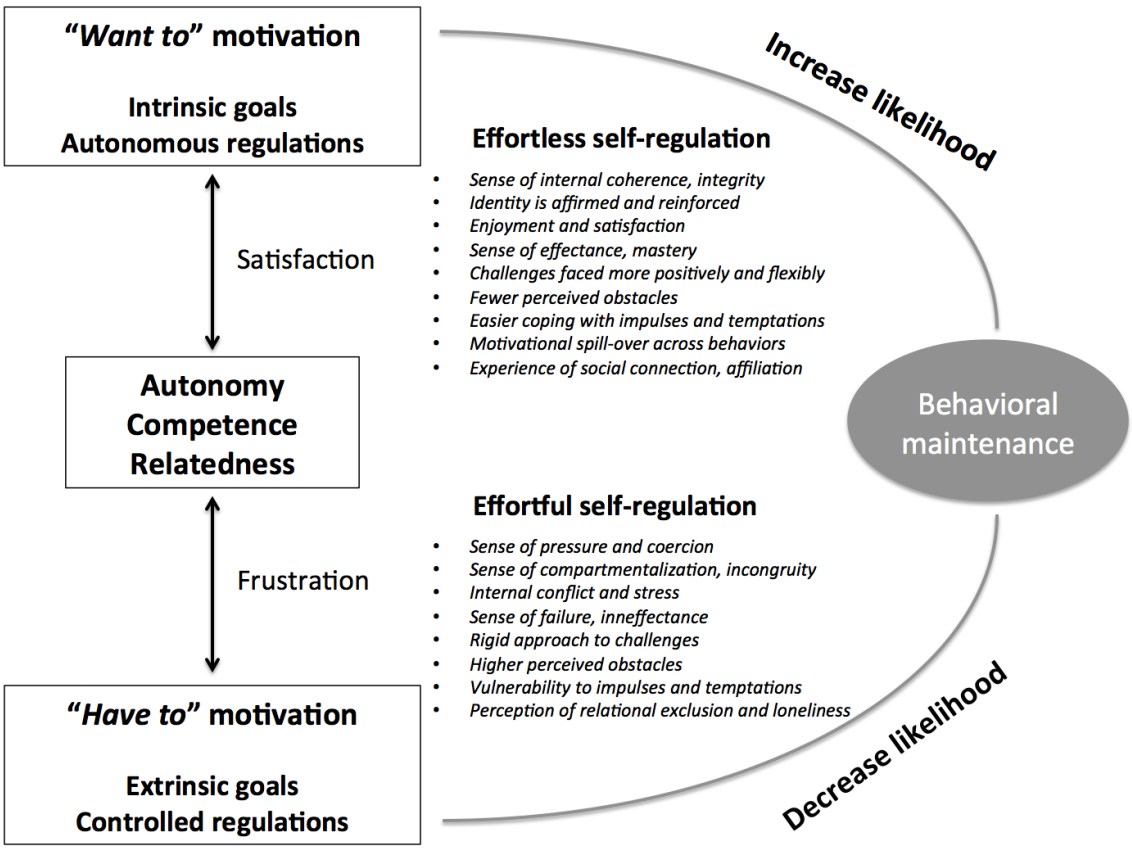


Figure. Critical processes and conditions involved in behavioral maintenance.

In contrast, when the individual experience of autonomy, competence, and relatedness (in relation to weight control behaviors) is actively frustrated by controlling (i.e., pressuring and manipulative) environments, and change remains a function of external or internal pressure, the psychological energy required to self-regulate the behaviors is thought to be higher. Consequently, resource depletion and fatigue, behavioral non-adherence (e.g., quitting the weight loss attempt), and negative psychological consequences are more likely to ensue. In this case, other conditions may apply such as the experience of pressure and obligation; a sense of incongruity (because behavior change

does not reflect the individual's values); feelings of guilt, inferiority, and self-criticism; the adoption of negative and rigid behavioral patterns; and the experience of social isolation and not being accepted, among others.

A growing body of studies has investigated the relation between SDT-related motivation variables and weight loss maintenance or energy balance-related behaviors (Patrick, Gorin, & Williams, 2010; Teixeira, Silva, Mata, Palmeira, & Markland, 2012). For instance, Gorin et al. showed that autonomy support from one's partner predicted better weight loss outcomes at 6 and 18 months among overweight and obese individuals participating in a behaviorally based lifestyle intervention, while more directive forms of support hampered progress (Gorin, Powers, Koestner, Wing, & Raynor, 2014). More recently, in the context of a 1-year SDT-based randomized controlled trial with a 2-year follow-up period, a large set of behavioral and psychological variables at the end of intervention as predictors of 3-year weight loss maintenance in overweight and obese women was examined (Santos, Mata, Silva, Sardinha, & Teixeira, 2015). Seeking for a hierarchy of predictors, this study showed that, from the 28 potential predictors included (within general and exercise motivation, psychological wellbeing and quality of life, eating behaviors and eating habits, and physical activity), exercise autonomous motivation emerged as the best predictor of at least 10% weight loss maintenance at 3 years. Moreover, women with high exercise-related autonomous motivation also showed greater psychological wellbeing, quality of life, and a more adaptive motivational profile (e.g., higher perceived choice and self-efficacy), suggesting a synergy between these features. An earlier longitudinal study from the same trial highlighted the importance of increasing autonomous motivation during treatment (1 year) for long-term physical activity participation (2 years), which mediated long-term (3 years) weight change (Silva et al., 2011). In a different cohort, an epidemiological study recently explored the association of different aspects of physical activity motivation – including intrinsic motivation and goals, namely health, fitness, appearance, weight, relaxation, and stress relief goals – with short and long-term behavior among Australian women. It showed that intrinsic motivation was the most predictive variable for sustaining physical activity participation over time among women trying to control their weight (Santos, Ball, Crawford, & Teixeira, 2016).

For its role in energizing the direction and persistence of human behavior, motivation is clearly among the best candidates for predicting weight loss maintenance. As these and other studies show (see (Ng, et al., 2012) for a meta-analysis of SDT empirical studies and (Teixeira et al., 2015) for a systematic review of intervention studies), not all

types of motivation predict long-term and positive behavioral outcomes. Therefore, targeting the motivational quality underlying weight-related behaviors, rather than imposing and prescribing behavioral changes, seems to be more promising for helping individuals achieve weight loss maintenance. This can be promoted by creating more enjoyable contexts, helping individuals set their own valued and aspired goals (instead of imposing or promoting standard and socially-valued goals), exploring how goals can be accomplished in their daily living (i.e., focusing on their own behavioral targets), and identifying factors that encourage more autonomous reasons for changing the behaviors while supporting autonomous action (for example, by giving structured choice). Taking the example mentioned above – engaging in physical activity as a weight control behavior –, health professionals can emphasize the experience of the behavior itself, and more intrinsic and positive psychological benefits of regular practice. For example, by reducing the "instrumental" focus (i.e., as a means to achieve weight loss and maintenance) and encouraging individuals to explore a way to exercise that is fun and enjoyable, challenging yet personally valuable, and that fits in their lifestyle, therefore increasing the potential for long-term integration. For instance, if an individual likes to dance, the suggestion can rely on trying various dance classes, instead of suggesting one of the activities on the top of the fitness trends (e.g., high-intensity interval training); these are promoted and valued by many people worldwide but may not be suitable for that particular person. The challenge is thus supporting a shift from "should/must/have to" motivation (i.e., simply comply with demands) to "want to" motivation (i.e., accept the regulation for change as one's one) for adopting the weight control and other behaviors requiring self-regulation (Milyavskaya, Inzlicht, Hope, & Koestner, 2015). Meanwhile, while research is uncovering the neuroaffective mechanisms by which autonomous motivation influences self-regulation (Legault & Inzlicht, 2013), more SDT-based intervention research is needed to further support (or reject) the benefits of such an approach and, perhaps more importantly, its parameters of effectiveness.

References

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. doi: 10.1207/S15327965pli1104_01

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology, 49*(3), 182-185. doi: 10.1037/a0012801

Gorin, A. A., Powers, T. A., Koestner, R., Wing, R. R., & Raynor, H. A. (2014). Autonomy support, self-regulation, and weight loss. *Health Psychology, 33*(4), 332-339. doi: 10.1037/a0032586

Ingledew, D. K., & Markland, D. (2009). Three levels of exercise motivation. *Applied Psychology: Health and Well-Being, 1*(3), 336-355. doi: 10.1111/j.1758-0854.2009.01015.x

Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin, 22*(3), 280-287. doi: 10.1177/0146167296223006

Kwasnicka, D., Dombrowski, S. U., White, M., & Sniehotta, F. (2016). Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. *Health Psychology Review*, 1-20. doi: 10.1080/17437199.2016.1151372

Legault, L., & Inzlicht, M. (2013). Self-determination, self-regulation, and the brain: autonomy improves performance by enhancing neuroaffective responsiveness to self-regulation failure. *Journal of Personality and Social Psychology, 105*(1), 123-138. doi: 10.1037/a0030426

MacLean, P. S., Wing, R. R., Davidson, T., Epstein, L., Goodpaster, B., Hall, K. D.,… Ryan, D. (2015). NIH Working Group Report: Innovative research to improve maintenance of weight loss. *Obesity (Silver Spring), 23*(1), 7-15. doi: 10.1002/oby.20967

Milyavskaya, M., Inzlicht, M., Hope, N., & Koestner, R. (2015). Saying "no" to temptation: Want-to motivation improves self-regulation by reducing temptation rather than by increasing self-control. *Journal of Personality and Social Psychology, 109*(4), 677-693. doi: 10.1037/pspp0000045

Ng, J. Y., Ntoumanis, N., Thogersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-Determination Theory Applied to Health Contexts: A Meta-Analysis. *Perspectives on Psychological Sciences, 7*(4), 325-340. doi: 10.1177/1745691612447309

Patrick, H., Gorin, A. G., & Williams, G. C. (2010). Lifestyle change and maintenance in obesity treatment and prevention: a self-determination theory perspective. In L. Dubé, A. Bechara, A. Dagher, A. Drewnowski, J. Lebel, P. James & R. Y. Yada (Eds.), *Obesity prevention: the role of brain and society on individual behavior* (pp. 365-374): Elsevier, Inc.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78. doi: 10.1037//0003-066X.55.1.68

Santos, I., Ball, K., Crawford, D., & Teixeira, P. J. (2016). Motivation and Barriers for Leisure-Time Physical Activity in Socioeconomically Disadvantaged Women. *PLoS One, 11*(1), e0147735. doi: 10.1371/journal.pone.0147735

Santos, I., Mata, J., Silva, M. N., Sardinha, L. B., & Teixeira, P. J. (2015). Predicting long-term weight loss maintenance in previously overweight women: A signal detection approach. *Obesity (Silver Spring), 23*(5), 957-964. doi: 10.1002/oby.21082

Silva, M. N., Markland, D., Carraça, E. V., Vieira, P. N., Coutinho, S. R., Minderico, C. S., . . . Teixeira, P. J. (2011). Exercise autonomous motivation predicts 3-yr weight loss in women. *Medicine and Science in Sports and Exercise, 43*(4), 728-737. doi: 10.1249/MSS.0b013e3181f3818f

Teixeira, P. J., Carraca, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. [Review]. *International Journal of Behavioral Nutrition and Physical Activity, 9*, 78. doi: 10.1186/1479-5868-9-78

Teixeira, P. J., Carraca, E. V., Marques, M. M., Rutter, H., Oppert, J. M., De Bourdeaudhuij, I., . . . Brug, J. (2015). Successful behavior change in obesity interventions in adults: a systematic review of self-regulation mediators. *BMC Medicine, 13*, 84. doi: 10.1186/s12916-015-0323-6

Teixeira, P. J., Silva, M. N., Mata, J., Palmeira, A. L., & Markland, D. (2012). Motivation, self-determination, and long-term weight control. *International Journal of Behavioral Nutrition and Physical Activity, 9*, 22. doi: 10.1186/1479-5868-9-22

Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). The Development of the Five Mini-theories of Self-determination Theory: An Historical Overview, Emerging Trends, and Future Directions. In T. C. Urdan & S. A. Karabenick (Eds.), *The Decade Ahead : Theoretical Perspectives on Motivation and Achievement* (Vol. 16A, pp. 105–166). Bingley, UK: Emerald.

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 3*, 263-280. doi: 10.1037/a0032359

Wing, R. R., & Phelan, S. (2005). Long-term weight loss maintenance. *American Journal of Clinical Nutrition*, 82(Suppl): 222S-225S.

APPENDICES

Self-report instruments used in the thesis

Prevalência de Controlo do Peso e Factores Associados em Adultos Portugueses

Grupo I – Tentativas de perda e manutenção do peso

1. Relativamente ao seu peso, nos últimos 12 meses tentou:
    a. Perder algum peso
    b. Manter o seu peso, para não aumentar
    c. Manter o seu peso, para não perder
    d. Aumentar de peso
    e. Nada, não se preocupou de todo com o seu peso
    f. Nada, mas há mais de 12 meses, e já depois de completar 18 anos, procurou perder ou manter o seu peso
    g. Não sabe / Não responde

    (Se respondeu "c", "d", "e", "f" ou "g" saltar para a questão 13)
2. Das seguintes opções, indique o que faz ou fez no passado para gerir o seu peso, mesmo que não o faça exclusivamente para esse efeito:

    (Por favor responda com base no que faz ou fez e não no que já ouviu sobre como controlar o peso)
    a. Para controlar o seu peso pratica atividade física de forma regular (pelo menos 3 vezes por semana)

        ☐ Sim ☐ Não ☐ Não sabe / Não responde
    b. Para controlar o seu peso toma um pequeno-almoço completo regularmente (pelo menos 3 vezes por semana)

        ☐ Sim ☐ Não ☐ Não sabe / Não responde
    c. Para controlar o seu peso tem o hábito de incluir refeições ao longo do dia (pequena merenda ou snack de manhã ou tarde)

        ☐ Sim ☐ Não ☐ Não sabe / Não responde
    d. Para controlar o seu peso seleciona de forma atenta e consciente os alimentos (p. ex.: lê rótulos, compra alimentos mais saudáveis – ricos em fibra, pobres em gordura e açúcar)

        ☐ Sim ☐ Não ☐ Não sabe / Não responde
    e. Para controlar o seu peso consome regularmente sopa nas refeições principais (pelo menos 3 vezes por semana)

        ☐ Sim ☐ Não ☐ Não sabe / Não responde
    f. Para controlar o seu peso consome regularmente saladas ou legumes nas refeições (pelo menos 3 vezes por semana)

        ☐ Sim ☐ Não ☐ Não sabe / Não responde
    g. Para controlar o seu peso opta por beber água em detrimento de sumos, refrigerantes ou álcool

        ☐ Sim ☐ Não ☐ Não sabe / Não responde

h. Para controlar o seu peso come pausadamente e procura mastigar de forma completa os alimentos

☐ Sim ☐ Não ☐ Não sabe / Não responde

i. Para controlar o seu peso come pequenas porções de alimentos nas refeições

☐ Sim ☐ Não ☐ Não sabe / Não responde

j. Para controlar o seu peso elabora registos do consumo de alimentos ou da prática de atividade física

☐ Sim ☐ Não ☐ Não sabe / Não responde

k. Para controlar o seu peso contabiliza as calorias das refeições

☐ Sim ☐ Não ☐ Não sabe / Não responde

l. Para controlar o seu peso frequenta um programa de controlo do peso

☐ Sim ☐ Não ☐ Não sabe / Não responde

m. Para controlar o seu peso recebe orientações de um especialista

☐ Sim ☐ Não ☐ Não sabe / Não responde

n. Para controlar o seu peso consome medicamentos ou suplementos para emagrecer

☐ Sim ☐ Não ☐ Não sabe / Não responde

o. Para controlar o seu peso recorre a laxantes ou diuréticos

☐ Sim ☐ Não ☐ Não sabe / Não responde

p. Para controlar o seu peso provoca o vómito ou faz jejum prolongado

☐ Sim ☐ Não ☐ Não sabe / Não responde

q. Para controlar o seu peso recorre a dietas da moda

☐ Sim ☐ Não ☐ Não sabe / Não responde

r. Para controlar o seu peso informa-se sobre nutrição e exercício físico (p.ex.: compra livros, lê revistas, pesquisa na internet)

☐ Sim ☐ Não ☐ Não sabe / Não responde

s. Outra(s). Qual(is)? _____

3. Vou em seguida ler-lhe algumas razões ou motivos que levaram outras pessoas a tentar perder ou manter o seu peso. Peço-lhe que me responda de acordo com a sua concordância, ou seja, se discorda fortemente, discorda, concorda ou concorda fortemente com cada uma das afirmações.

a. Para melhorar a sua saúde em geral e prevenir doenças futuras

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

b. Para responder a necessidades imediatas relacionadas com um problema de saúde ou por indicação de um profissional de saúde

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

c. Para manter ou obter uma aparência física com a qual se sente mais confortável

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

d. Para melhorar a sua autoestima em relação ao o seu corpo

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

e. Para melhorar o seu bem estar no dia-a-dia (p. ex.: sentir-se com mais energia, dormir melhor, andar sem se cansar)

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

f. Para se sentir mais bem integrado na sociedade ou para evitar ser descriminado(a)

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

g. Para cumprir requisitos específicos da sua profissão ou ocupação

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

h. Para melhorar a sua condição física ou para conseguir praticar desporto mais facilmente

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

i. Outra(s). Qual(is)? _____

4. Procurou ou procura atualmente gerir o seu peso (perder ou não aumentar) porque...
   (se tiver dúvidas ou se os motivos se alteraram com o tempo refira-se à sua realidade nos últimos 12 meses)

   a. Porque outras pessoas (p. ex.: familiares, amigos, profissionais de saúde) ou situações específicas da sua vida o(a) pressionaram direta ou indiretamente nesse sentido

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

   b. Porque não conseguiria gostar inteiramente de si se não o fizesse

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

   c. Porque assim se sente mais próximo de si próprio(a), da pessoa que realmente é

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

   d. Porque gerir o seu peso (p. ex.: fazer atividade física e cuidar da alimentação) é em si mesmo um processo recompensador e por vezes um desafio interessante ou divertido

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

5. Alguma vez tentou perder peso na sua vida adulta?
   ☐ Sim ☐ Não ☐ Não sabe / Não responde

   a. Se sim, quantas vezes?
   ☐ 1 a 3 vezes ☐ 4 a 9 vezes ☐ 10 vezes ou mais
   ☐ Sempre a tentar ☐ Não sabe / Não responde

6. Durante quanto tempo permaneceu, em média, numa tentativa? _____meses
7. Qual o período do ano que escolhe para tentar perder peso?
   ☐ Nenhum em particular ☐ Primavera ☐ Verão
   ☐ Outono ☐ Inverno ☐ Não sabe / Não responde
8. Nos últimos dois anos, quantas vezes tentou perder peso? _____
   (Perguntar apenas se respondeu "a" na pergunta 1)
   ☐ 1 a 3 vezes ☐ 4 a 9 vezes ☐ 10 vezes ou mais
   ☐ Sempre a tentar ☐ Não sabe / Não responde
9. Há quanto tempo iniciou a sua última tentativa de perda de peso? _____meses
10. Qual o grau de dificuldade que teve ou tem para perder peso?
    (se tiver dúvidas refira-se à sua realidade nos últimos 12 meses)
    ☐ Extremamente fácil ☐ Fácil ☐ Nem fácil nem difícil
    ☐ Difícil ☐ Extremamente difícil ☐ Não sabe / Não responde

11. Qual o grau de dificuldade que teve ou tem para gerir o seu peso sem que este aumente? (se tiver dúvidas refira-se à sua realidade nos últimos 12 meses)

    ☐ Extremamente fácil ☐ Fácil ☐ Nem fácil nem difícil

    ☐ Difícil ☐ Extremamente difícil ☐ Não sabe / Não responde

12. A que se deve este nível de dificuldade? (Responder apenas se respondeu "Difícil" ou "Extremamente difícil" a uma das questões 10 ou 11)

    a. À resistência metabólica ou fisiológica do seu corpo

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    b. Ao meio físico e social envolvente, que tornam esta tarefa difícil

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    c. Às suas dificuldades pessoais (p. ex.: força de vontade, falta de motivação) em fazer o que é necessário para gerir melhor o peso

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    d. Porque não gosta de fazer o que é necessário para gerir o peso

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    e. A dificuldades económicas

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    f. À falta de motivação suficiente para fazer atividade física/comer melhor

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    g. À falta de tempo para fazer atividade física/ter mais cuidados alimentares

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    h. A obstáculos (p. ex.: limitações de saúde, obrigações familiares) que o(a) impedem de fazer atividade física ou cuidar melhor da sua alimentação

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    i. Porque sente que não pode falhar ou cometer algum deslize, senão sabe que "lá se vai a perda de peso"

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    j. Porque sente muita dificuldade em resistir ao cheiro, paladar ou até ao aspecto dos alimentos e acaba por comer mais do que planeou

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    k. Porque se sente frequentemente com muita fome ou vontade de comer

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    l. Outra(s). Qual(is)? _____

Grupo II – Hábitos alimentares

13. Relativamente aos seus hábitos alimentares, e tendo por referência os últimos 12 meses, considera que é uma pessoa que habitualmente come:

    ☐ Muito devagar ☐ Relativamente devagar ☐ Velocidade média

    ☐ Relativamente rápido ☐ Muito rápido ☐ Não sabe / Não responde

14. Tendo por referência os últimos 12 meses, quando toma as suas refeições principais, quanto tempo demora aproximadamente?

	<15min	15-20min	21-25min	26-30min	>30min	Não sabe / Não responde
Pequeno-almoço	☐	☐	☐	☐	☐	☐
Almoço	☐	☐	☐	☐	☐	☐
Jantar	☐	☐	☐	☐	☐	☐

15. Habitualmente, nos últimos 12 meses, qual a bebida que toma predominantemente à refeição?

	Pequeno-almoço	Almoço	Jantar
Não bebe qualquer bebida	☐	☐	☐
Água	☐	☐	☐
Chá sem açúcar	☐	☐	☐
Chá com açúcar	☐	☐	☐
Café	☐	☐	☐
Leite simples	☐	☐	☐
Leite com açúcar	☐	☐	☐
Leite com chocolate	☐	☐	☐
Iogurte líquido	☐	☐	☐
Refrigerante calórico (p. ex.: Fanta, Sumol, Coca-cola)	☐	☐	☐
Refrigerante não-calórico (p. ex.: Coca-cola zero, Light)	☐	☐	☐
Sumo de fruta natural	☐	☐	☐
Néctar de fruta / Sumo	☐	☐	☐
Bebida alcoólica	☐	☐	☐
Outra. Qual?	_____	_____	_____
Não sabe / Não responde	☐	☐	☐

16. Na maioria das vezes, qual a quantidade habitual de bebida, tendo por referência os últimos 12 meses?

	Pequeno-almoço	Almoço	Jantar
1 copo (~ 250mL)	☐	☐	☐
2 copos	☐	☐	☐
> 2 copos	☐	☐	☐
Não sabe / Não responde	☐	☐	☐

Grupo III - Hábitos de Atividade Física

17. Podemos definir Exercício Regular como qualquer atividade física planeada (p. ex.:, fazer uma caminhada , aulas de ginásio, jogging, andar de bicicleta, nadar, praticar um desporto, etc.). Gostaríamos de saber se faz essas atividades, ou qualquer combinação das mesmas, pelo menos 3 vezes por semana com a duração mínima de 25 minutos por sessão e geralmente com uma intensidade que aumente um pouco a sua frequência cardíaca e provoque algum aumento do calor corporal (p. ex.: aquilo que sente quando caminha rapidamente durante alguns minutos).
    (escolha apenas uma opção)
    a. Sim, e faço há MAIS de 6 meses ☐
    b. Sim, e faço há MENOS de 6 meses ☐
    c. Não, mas pretendo INICIAR nos próximos 30 dias ☐
    d. Não, mas pretendo INICIAR nos próximos 6 meses ☐
    e. Não, e NÃO pretendo iniciar nos próximos 6 meses ☐
    f. Não sabe / Não responde ☐

18. Relativamente à prática de atividade física, indique o grau de concordância com as seguintes afirmações:
    a. Fazer exercício físico ou desporto não é algo que escolheria fazer por si próprio.

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

    b. Fazer exercício físico ou desporto é algo que sabe que deveria fazer, mas não lhe interessa muito.

☐ Discordo fortemente ☐ Discordo ☐ Concordo ☐ Concordo fortemente ☐ Não sabe / Não responde

Grupo IV - Dados atuais do peso

19. Considera que tem:
☐ Obesidade ☐ Excesso de peso ☐ Peso normal ☐ Baixo peso ☐ Não sabe / Não responde
20. Indique, por favor, o seu peso e a sua altura (se tiver dúvidas faça uma estimativa):
    Peso _____ kg Altura _____ m
21. Nos últimos 12 meses teve algum problema de saúde ou doença que causou ganho ou perda de peso para além do normal (p.ex.: diabetes, hipertiroidismo)?
    ☐ Sim ☐ Não ☐ Não sabe / Não responde
22. Quanto pesava quando iniciou a última tentativa de perda de peso? _____kg
    (Perguntar apenas se respondeu "a" na pergunta 1)
23. Quanto gostava de pesar, realisticamente ?_____kg
24. Que peso seria minimamente aceitável para si, mesmo não sendo o desejado?_____kg
25. Qual o seu peso "de sonho", aquele que escolheria se pudesse escolher qualquer valor? _____ kg

26. Como se sente atualmente em relação ao seu peso e à sua forma corporal?

☐ Muito satisfeito ☐ Satisfeito ☐ Pouco satisfeito ☐ Nada satisfeito ☐ Não sabe / Não responde

Grupo V - Dados Sociodemográficos

27. Data de nascimento: _____
28. Sexo: ☐ Masculino ☐ Feminino
29. Região de Residência: ☐ Norte ☐ Centro ☐ Lisboa e Vale do Tejo ☐ Alentejo ☐ Algarve ☐ Madeira ☐ Açores ☐ Não sabe / Não responde
30. Estado civil: ☐ Solteiro ☐ Casado ☐ União de facto ☐ Divorciado ☐ Viúvo ☐ Não sabe / Não responde
31. Quantos anos de escolaridade completou com aproveitamento? _____anos
32. Qual a sua ocupação principal?
    ☐ Exerce uma profissão ☐ Estudante ☐ Ocupa-se das tarefas domésticas ☐ À procura do 1º emprego ☐ Desempregado ☐ Reformado ☐ Outra situação. Qual? _____
    ☐ Não sabe / Não responde
33. Qual é a sua profissão: _____
    (responder apenas se respondeu "Exerce uma profissão" na questão 32)
34. Qual o número de pessoas que compõe o seu agregado familiar? _____pessoas
35. Qual a principal fonte de rendimento da sua família?
    a. A fonte principal é fortuna herdada ou adquirida
    b. Os rendimentos consistem em lucros de empresas, altos honorários, lugares bem remunerados, etc.
    c. Os rendimentos correspondem a um vencimento mensal fixo
    d. Os rendimentos resultam de salários: remuneração por semana, por jorna, por horas ou à tarefa
    e. O indivíduo ou família são sustentados pela beneficência pública ou privada. Não se incluem neste grupo os subsídios de desemprego ou de incapacidade para o trabalho
    f. Não sabe / Não responde
36. Relativamente ao conforto da sua habitação...
    a. Casa ou andar luxuoso e muito grande, oferecendo aos seus moradores o máximo conforto
    b. Casa ou andar que sem ser luxuoso é espaçoso e confortável
    c. Casa ou andar modesto, bem construído e em bom estado de conservação, bem iluminado e arejado, com cozinha e casa de banho
    d. Categoria intermédia entre c. e e.
    e. Casa ou andar desprovido de todo o conforto, sem ventilação, ou onde moram demasiadas pessoas
    f. Não sabe / Não responde
37. Relativamente à tipologia da sua zona residencial...
    a. Zona residencial elegante, onde o valor do terreno ou os alugueres são elevados
    b. Zona residencial boa, de ruas largas com casas confortáveis e bem conservadas

c. Categoria intermédia entre b. e d.
d. Ruas comerciais estreitas ou antigas, com casas de aspecto menos cuidado
e. Bairro operário, populoso, mal arejado ou bairro em que o valor do terreno está muito diminuído
f. Não sabe / Não responde

Questionário Principal - RNCP

PARTE 1 – Dados demográficos, história clínica e história do peso

1.	Data de Nascimento:
2.	Estado Civil: □ Solteiro/a □ Casado/a □ União de Facto □ Divorciado/a □ Viúvo/a
3.	Profissão (ocupação):
4.	Habilitações Literárias (nível mais elevado que atingiu):
5.	Como teve conhecimento do RNCP?

6. Foi participante do Programa PESO? □ Sim □ Não

7. Foi participante do Programa PESO COMUNITÁRIO? □ Sim □ Não

8. Está atualmente empregado/a? □ Sim □ Não

9. Trabalhou nos últimos 3 meses? □ Sim □ Não

Se não trabalhou, qual a razão?

- A estudar □
- À procura de 1º emprego □
- Doméstico/a □
- Vive de rendas e juros □
- Reformado/a por invalidez □
- Reformado/a por idade □
- À espera de reforma (não doente) □
- Pensionista □
- Férias □
- Doente há 3 meses ou mais (não reformado/a) □
- Doente há menos de 3 meses □
- Outras situações:_____

10. Por quantos elementos é constituído o seu agregado familiar? □ Um □ Dois □ Três □ Quatro □ Cinco ou mais

11. Com quem vive? (pode escolher mais do que uma opção) □ Sozinho/a □ Marido/Mulher □ Parceiro/a □ Filhos □ Irmãos □ Pais □ Avós

12. É fumador(a)? □ Sim □ Não

a. Se respondeu sim:

i. Fuma: □ Ocasionalmente □ Diariamente

ii. Nas últimas duas semanas: □ Não Fumou □ Ocasionalmente □ Diariamente

iii. O que fuma habitualmente? □ Cigarros □ Cigarros e cachimbo □ Cachimbo □ Charutos

iv. Quantos cigarros fuma diariamente? _____ cigarros

v. Com que idade começou a fumar? _____ anos

13. Existe alguma doença ou problema de saúde de que sofra atualmente ou já tenha sofrido? □ Sim □ Não

Se sim, qual(is)? Cancro □ Sim □ Não

Doença Cardiovascular □ Sim □ Não

Asma ou Bronquite Asmática □ Sim □ Não

Tensão Alta □ Sim □ Não

Doença Pulmonar □ Sim □ Não

Doença Gastrointestinal □ Sim □ Não

Doença Renal □ Sim □ Não

Doença Infectocontagiosa □ Sim □ Não

Diabetes □ Sim □ Não

Bócio ou outras Doenças da Tiróide □ Sim □ Não

Outras Doenças Hormonais □ Sim □ Não

Esquizofrenia □ Sim □ Não

Depressão (diagnosticada clinicamente) □ Sim □ Não

Outras Doenças: _____

14. Está sob Medicação? □ Sim □ Não Se sim, indique qual(is) a seguir.

Nome -
Posologia -
Nome -
Posologia -
Nome -
Posologia -

15. Se é do sexo feminino, já entrou na menopausa? □ Sim □ Não

16. Qual a sua altura? _____

17. Considera que está atualmente com excesso de peso? □ Sim □ Não

a) Se sim, que idade tinha quando percebeu que estava com peso a mais? _____ anos

18. O seu pai apresenta/apresentou excesso de peso ou obesidade? □ Sim □ Não □ Não sei

19. A sua mãe apresenta/apresentou excesso de peso ou obesidade? □ Sim □ Não □ Não sei

PARTE 2 – Estratégias de perda de peso

ATENÇÃO: nas próximas questões (da 21 à 35) queremos saber o que fez para <u>perder peso</u>, da última vez que isso aconteceu (originando o peso aproximado que tem hoje). Não existem respostas corretas ou erradas. Por favor responda da forma mais verdadeira para <u>o seu</u> caso pessoal.

21. Considerando esta última vez que perdeu peso:

1.	Quando iniciou essa perda de peso? (mês aproximado e ano)	
2.	Há quanto tempo mantém o seu peso atual (ou seja, com uma variação não superior a 2-3 kg)? (em anos ou meses)	
3.	Para perder peso alterou apenas hábitos e comportamentos alimentares?	□ Sim □ Não
4.	Para perder peso alterou apenas hábitos de atividade física?	□ Sim □ Não
5.	Para perder peso alterou os seus hábitos em ambos (alimentação e atividade física)?	□ Sim □ Não

22. Se praticou exercício físico para perder peso, qual o tipo de exercício que realizou? Se não praticou, não responda.

		NUNCA	POUCAS VEZES	ALGUMAS VEZES	MUITAS VEZES	SEMPRE
a.	Corrida/Jogging	1	2	3	4	5
b.	Caminhar	1	2	3	4	5
c.	Aula de Grupo (p.ex. aeróbica)	1	2	3	4	5
d.	Desporto de competição	1	2	3	4	5
e.	Natação	1	2	3	4	5
f.	Ciclismo	1	2	3	4	5
g.	Treino com cargas (p.ex. musculação)	1	2	3	4	5
h.	Outro: _____	1	2	3	4	5
	Outro: _____	1	2	3	4	5

23. Se praticou exercício físico para perder peso, onde o realizou normalmente? Se não praticou, não responda.

		NUNCA	POUCAS VEZES	ALGUMAS VEZES	MUITAS VEZES	SEMPRE
a.	Casa	1	2	3	4	5
b.	Trabalho	1	2	3	4	5
c.	Ginásio	1	2	3	4	5
d.	Ar livre	1	2	3	4	5
e.	Outro: _____	1	2	3	4	5
	Outro: _____	1	2	3	4	5

24. Se praticou exercício físico para perder peso, com quem o efetuou normalmente? Se não praticou, não responda.

		NUNCA	POUCAS VEZES	ALGUMAS VEZES	MUITAS VEZES	SEMPRE
a.	Grupo de exercício	1	2	3	4	5
b.	Amigo(s)	1	2	3	4	5
c.	Familiar(es)	1	2	3	4	5
d.	Sozinho/a	1	2	3	4	5
e.	Outro: _____	1	2	3	4	5
	Outro: _____	1	2	3	4	5

25. Se alterou hábitos alimentares ou outros comportamentos do seu estilo de vida para perder peso, o que fez?

		NUNCA	POUCAS VEZES	ALGUMAS VEZES	MUITAS VEZES	SEMPRE
1.	Passou a subir escadas em vez de utilizar elevadores ou escadas rolantes (p.ex. no seu prédio, em centros comerciais, no local de trabalho)	1	2	3	4	5
2.	Escolheu caminhar quando habitualmente costumava ir de carro ou transportes (p.ex. ir às compras, ir aos correios ou à farmácia)	1	2	3	4	5
3.	Estacionou o carro num local mais distante da entrada (p.ex. centros comerciais, trabalho) para poder caminhar mais até à entrada	1	2	3	4	5
4.	Fazer pausas durante o trabalho ou utilizar os intervalos do trabalho para caminhar ou movimentar-se mais (p.ex. caminhar até o restaurante)	1	2	3	4	5
5.	Passou a tomar o pequeno-almoço regularmente?	1	2	3	4	5
6.	Passou a selecionar conscientemente os alimentos (p.ex. ler rótulos)?	1	2	3	4	5
7.	Reduziu a porção habitual de alimentos numa refeição?	1	2	3	4	5
8.	Reduziu a quantidade de alimentos com gordura?	1	2	3	4	5
9.	Reduziu a quantidade de alimentos com açúcar?	1	2	3	4	5
10.	Passou a ter em casa poucos alimentos de alto teor de gordura ou açúcar?	1	2	3	4	5
11.	Passou a ter em casa alimentos mais saudáveis (p.ex. legumes, fruta, cereais, pão integral)?	1	2	3	4	5
12.	Adquiriu o hábito de incluir pequenas refeições ao longo do dia (p.ex. meio da manhã, lanche)?	1	2	3	4	5
13.	Consumiu alimentos ricos em fibra alimentar (p.ex. pão, cereais de pequeno-almoço)?	1	2	3	4	5
14.	Passou a incluir nas suas refeições salada ou legumes?	1	2	3	4	5
15.	Reduziu a gordura nas refeições, confecções e/ou temperos?	1	2	3	4	5
16.	Passou a iniciar as suas refeições com um prato de sopa?	1	2	3	4	5

17.	Substituiu os molhos por alternativas menos calóricas (p.ex. ervas aromáticas, sumo de limão)?	1	2	3	4	5
18.	Diminuiu/Excluiu das refeições principais alimentos ricos em amido (p.ex. arroz, massa, batata, feijão, grão de bico)?	1	2	3	4	5
19.	Aumentou a quantidade de proteína (p.ex. carne, peixe, ovos)?	1	2	3	4	5
20.	Diminuiu a ida a restaurantes?	1	2	3	4	5
21.	Evitou relacionar-se com pessoas com excesso de peso?	1	2	3	4	5
22.	Relacionou-se mais com pessoas com peso normal?	1	2	3	4	5
23.	Relacionou-se mais com pessoas que praticam exercício?	1	2	3	4	5
24.	Elaborou registos do consumo de alimentos ou de prática de exercício?	1	2	3	4	5
25.	Comprou livros ou revistas relacionadas com nutrição ou exercício?	1	2	3	4	5
26.	Em eventos sociais e no que respeita à alimentação, aprendeu a dizer "não" aos outros?	1	2	3	4	5
27.	Estabeleceu objectivos concretos (p.ex. na perda de peso, na frequência semanal de exercício?	1	2	3	4	5
28.	Pediu apoio à família ou a amigos?	1	2	3	4	5
29.	Sentiu-se elogiado por outros pelos progressos conseguidos?	1	2	3	4	5
30.	Passou a pesar-se regularmente?	1	2	3	4	5
31.	Usou o jejum (muitas horas sem comer)?	1	2	3	4	5
32.	Não fez algumas refeições (saltou refeições)?	1	2	3	4	5
33.	Contabilizou as calorias de refeições?	1	2	3	4	5
34.	Tomou comprimidos para emagrecer receitados por um médico?	1	2	3	4	5
35.	Usou suplementos nutricionais (p.ex. de ervanárias)?	1	2	3	4	5
36.	Passou a usar substitutos de refeição (p.ex. batidos, barras, refeições pré-preparadas?	1	2	3	4	5
37.	Provocou o vómito?	1	2	3	4	5
38.	Tomou laxantes ou diuréticos?	1	2	3	4	5
39.	Seguiu uma dieta aconselhada por amigos/família? □ Sim □ Não					
40.	Recebeu orientações de um especialista? □ Sim □ Não					
41.	Participou em algum programa com o objectivo de controlo do peso? Em grupo □ Sim □ Não Se sim: □ Individual □					
42.	Utilizou uma banda gástrica ou intervenção cirúrgica? □ Sim □ Não					
43.	Outras estratégias: _____					
	_____					
	_____					

Indique o efeito que a perda de peso teve nas áreas seguintes (nota: não existem respostas corretas ou erradas):

	Piorou Muito	Piorou	Não Piorou nem Melhorou	Melhorou	Melhorou Muito
26. Qualidade de vida	1	2	3	4	5
27. Vitalidade e energia	1	2	3	4	5
28. Mobilidade física	1	2	3	4	5
29. Humor e disposição geral	1	2	3	4	5
30. Auto-confiança	1	2	3	4	5
31. Saúde física	1	2	3	4	5
32. Relacionamento interpessoal com:					
Família	1	2	3	4	5
Amigos	1	2	3	4	5
Colegas de trabalho	1	2	3	4	5
33. Rendimento no trabalho	1	2	3	4	5
34. Tempo disponível para hobbies	1	2	3	4	5

	Aumentou Muito	Aument ou	Não Aumentou nem Diminuiu	Diminuiu	Diminuiu Muito
35. Tempo gasto a pensar em:					
Comida	1	2	3	4	5
Peso	1	2	3	4	5

36. Houve algum evento ou situação que precipitou (despoletou) a perda de peso registada? □ Sim □ Não

Se sim, qual?

_____

37. Já alguma vez foi aconselhado/a a perder peso? □ Sim □ Não

i. Porque motivo? _____

ii. Quem o/a aconselhou? _____

iii. Já tentou perder peso mais do que uma vez na sua vida adulta? □ Sim □ Não

a. Se sim, quantas vezes? □ 2 a 3 vezes □ 4 a 9 vezes □ Mais de 10 vezes □ Estou sempre a tentar

iv. Durante quanto tempo permaneceu em média, numa tentativa? _____ (dias/meses/anos)

v. Que idade tinha quando tentou perder peso pela primeira vez? _____ anos

38. Qual o período do ano que escolhe, preferencialmente, para tentar perder peso?

□ Nenhum em particular □ Inverno □ Outono □ Primavera □ Verão

PARTE 3 – Estratégias de manutenção do peso

ATENÇÃO: nas próximas questões (da 39 à 50) considere o que faz ACTUALMENTE

39. Quantas vezes come por dia (incluindo todas as refeições principais e intermédias/merendas)? _____ vezes

40. Em média, quantas vezes por semana come em restaurantes ou noutros locais para refeições (pastelarias, etc.)? _____ vezes

41. Indique o número de vezes que se pesa numa balança, habitualmente?

	Menos de 1 vez por mês	Menos de 1 vez por semana	1 vez por semana	Mais de 1 vez por semana	1 vez por dia	Várias vezes por dia

		NUNCA	POUCAS VEZES	ALGUMAS VEZES	MUITAS VEZES	SEMPRE
1.	Toma o pequeno-almoço?	1	2	3	4	5
2.	Pratica atividade física regularmente (pelo menos 2 a 3 vezes por semana)?	1	2	3	4	5
3.	Seleciona conscientemente os alimentos (p.ex., ler rótulos)?	1	2	3	4	5
4.	Escolhe pequenas porções de alimentos numa refeição?	1	2	3	4	5
5.	Escolhe menos alimentos com gordura?	1	2	3	4	5
6.	Escolhe menos alimentos com açúcar?	1	2	3	4	5
7.	Tem em casa poucos alimentos de alto teor de gordura ou açúcar?	1	2	3	4	5
8.	Mantém em casa alimentos saudáveis (p.ex. legumes, fruta)?	1	2	3	4	5
9.	Tem o hábito de incluir pequenas refeições ao longo do dia (p.ex., meio da manhã, lanche)?	1	2	3	4	5
10.	Consome alimentos ricos em fibra alimentar (p.ex., pão, cereais de pequeno-almoço)?	1	2	3	4	5
11.	Inclui salada ou legumes nas suas refeições?	1	2	3	4	5
12.	Reduz a gordura nas refeições, confecções e/ou temperos?	1	2	3	4	5
13.	Inicia as suas refeições com um prato de sopa?	1	2	3	4	5
14.	Substitui os molhos por alternativas menos calóricas (p.ex., ervas aromáticas, sumo de limão)?	1	2	3	4	5
15.	Usa pouco/exclui das refeições principais alimentos ricos em amido (p.ex., arroz, massa, batata, feijão, grão de bico)?	1	2	3	4	5
16.	Escolhe mais alimentos ricos em proteína (p.ex. carne, peixe, ovos)?	1	2	3	4	5
17.	Vai menos vezes a restaurantes?	1	2	3	4	5
18.	Procura relacionar-se preferencialmente com pessoas com peso normal?	1	2	3	4	5
19.	Procura relacionar-se preferencialmente com pessoas que praticam exercício?	1	2	3	4	5
20.	Mantém visível uma foto de si próprio/a mais magro/a?	1	2	3	4	5
21.	Elabora registos do consumo de alimentos ou de prática de exercício?	1	2	3	4	5
22.	Compra livros ou revistas relacionadas com nutrição ou exercício?	1	2	3	4	5
23.	Come em intervalos regulares, mantendo um horário mais ou menos rotineiro?	1	2	3	4	5
24.	Percebe quando está a ganhar peso?	1	2	3	4	5
25.	Quando sente que está a ganhar peso coloca em marcha um plano (com mais atividade física ou maior restrição)?	1	2	3	4	5

26.	Quando comete alguns excessos alimentares sente-se culpado/a?	1	2	3	4	5
27.	Quando comete alguns excessos alimentares procura "compensar" nos dias seguintes (p.ex. com mais atividade física ou maior restrição)?	1	2	3	4	5
28.	Costuma recompensar-se por manter o peso estável (oferecer a si próprio/a pequenos mimos, ocasionalmente)?	1	2	3	4	5
29.	Em eventos sociais e no que respeita à alimentação, consegue dizer "não" aos outros?	1	2	3	4	5
30.	Estabelece objectivos concretos (p.ex., manter o peso num determinado intervalo, na frequência semanal de exercício?	1	2	3	4	5
31.	Pede apoio à família ou a amigos?	1	2	3	4	5
32.	Usa o jejum (muitas horas sem comer)?	1	2	3	4	5
33.	Salta refeições?	1	2	3	4	5
34.	Contabiliza calorias de refeições?	1	2	3	4	5
35.	Toma comprimidos para emagrecer receitados por um médico?	1	2	3	4	5
36.	Usa suplementos nutricionais (p.ex., de ervanárias)?	1	2	3	4	5
37.	Usa substitutos de refeição?	1	2	3	4	5
38.	Provoca o vómito?	1	2	3	4	5
39.	Toma laxantes ou diuréticos?	1	2	3	4	5
40.	Segue uma dieta aconselhada por amigos/família?	□ Sim □ Não				
41.	Recebe orientações de um especialista?	□ Sim □ Não				
42.	Outras estratégias para manter o peso estável: _____ _____ _____					

42.	Está contente com o seu peso atual?	□ Sim □ Não
a.	Qual o seu "peso de sonho"? _____ kg	
b.	Qual o peso que considera mais saudável para si? _____ kg	
c.	Se está com excesso de peso, quantos quilos pensa que tem a mais? _____ kg	
d.	Se está a tentar perder peso, quantos quilos tenciona perder nos próximos 12 meses? _____ kg	

43. Ao fim-de-semana mantém o mesmo regime alimentar que adopta durante a semana?

Menos rigoroso ao fim-de-semana			Igual			Mais rigoroso ao fim-de-semana
1	2	3	4	5	6	7

44. Nas férias mantém o mesmo regime alimentar que adopta durante o resto do ano? (escolha uma hipótese)

Menos rigoroso nas férias			Igual			Mais rigoroso nas férias
1	2	3	4	5	6	7

45. Quanto tempo passa a ver televisão, ao computador ou secretária num dia de semana típico? ____(horas)

46. Quanto tempo passa a ver televisão, ao computador ou secretária num dia de fim-de-semana típico? ____(horas)

47. Atualmente está a tentar PERDER mais peso? □ Sim □ Não

48. Atualmente está a tentar GANHAR peso? □ Sim □ Não

49. Atualmente, qual o grau de dificuldade que tem para PERDER peso?

Extremamente Fácil			Nem Fácil nem Difícil			Extremamente Difícil
1	2	3	4	5	6	7

50. Atualmente, qual o grau de dificuldade que tem para MANTER o peso?

Extremamente Fácil			Nem Fácil nem Difícil			Extremamente Difícil
1	2	3	4	5	6	7

Indique, por favor, o contacto de uma pessoa (médico, profissional de saúde, amigo ou familiar) que possa confirmar a evolução do seu peso durante a sua perda de peso até hoje.

□ Não existe ninguém que o possa fazer
Nome:
E-mail: Telefone:
□ Médico/a □ Outro/a Profissional de Saúde □ Familiar □ Amigo/a

NOTA: se esta pessoa for contactada, você será informado antecipadamente.

OBRIGADO PELA SUA PARTICIPAÇÃO!

Questionário de Frequência Alimentar

O questionário seguinte tem como objectivo avaliar a sua alimentação. Por favor, procure responder às questões de uma forma sincera, indicando aquilo que realmente come e não o que gostaria de comer, ou pensa que seria correto comer.

O questionário pretende identificar o consumo de alimentos do ano anterior. Assim para cada alimento, deve assinalar, no respectivo círculo, quantas vezes por dia, semana ou mês comeu em média , **nos últimos 12 meses**, cada um dos alimentos referidos nesta lista. Não se esqueça de assinalar os alimentos que **nunca** comeu, ou que come **menos de 1 vez por mês** na coluna nunca ou menos de 1 por mês.

Não se esqueça de ter em conta não só as vezes que o alimento é consumido sozinho mas também, aquelas em que é adicionado a outros alimentos ou pratos (ex: o café do café com leite, os ovos das omeletas, etc).

Para os alimentos que só comeu em determinadas épocas do ano (por ex: cerejas ou diospíros), assinale as vezes em que comeu o alimento nessa época, colocando uma cruz **(x)** na **última coluna** (**Sazonal**).

No item nº 86, anote a frequência com que comeu sopa de legumes. Quando consome caldo verde, canja ou sopa instantânea, com uma frequência de **pelo menos 1 vez por semana**, deve assinalar a frequência com que comeu este alimento no quadro existente para "**OUTROS ALIMENTOS**", tendo o cuidado de não o contar na frequência que refere para a sopa de legumes.

Se houver algum alimento não mencionado na lista de alimentos e que tenha consumido pelo menos 1 vez por semana, assinale, no quadro que existe para "**OUTROS ALIMENTOS**", a respectiva frequência e indique a quantidade média que costuma comer de cada vez. **Por ex: frutos tropicais, sumos de fruta natural, farinha de pau, canja, alheiras, cevada, rebuçados, etc**.

Por exemplo: Uma pessoa que bebe leite 2 vezes por dia e o leite que bebe é meio gordo, se a maior parte dos gelados que come é no verão e nessa época come um gelado por dia deve assinalar:

I. PRODUTOS LÁCTEOS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
1. Leite gordo	1 chávena = 250 ml	●	○	○	○	○	○	○	○	○	☐
2. Leite meio-gordo	1 chávena = 250 ml	○	○	○	○	○	○	●	○	○	☐
3. Leite magro	1 chávena = 250 ml	●	○	○	○	○	○	○	○	○	☐
7. Gelados	Um ou 2 bolas	○	○	○	○	○	●	○	○	○	☒

Preencha assim:	Não preencha assim:
● ☒	⊗ ⊗ ☐ ☒

Por exemplo: se come sopa uma vez por dia, mas 1 vez por semana é canja e não sopa de legumes assinale:

VIII. BEBIDAS E MISCELANEAS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
86. Sopa de legumes	1 prato	○	○	○	○	●	○	○	○	○	☐

OUTROS ALIMENTOS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
CANJA	PRATO	○	○	●	○	○	○	○	○	○	☐

No grupo **I. PRODUTOS LÁCTEOS** – Não se esqueça de considerar o leite que bebe com o café (**exemplo**: meia de leite, galão,...).

I. PRODUTOS LÁCTEOS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
1. Leite gordo	1 chávena = 250 ml	○	○	○	○	○	○	○	○	○	☐
2. Leite meio-gordo	1 chávena = 250 ml	○	○	○	○	○	○	○	○	○	☐
3. Leite magro	1 chávena = 250 ml	○	○	○	○	○	○	○	○	○	☐
4. Iogurte	Um =125g	○	○	○	○	○	○	○	○	○	☐
5. Queijo (de qualquer tipo incluindo queijo fresco e requeijão)	1 fatia = 30g	○	○	○	○	○	○	○	○	○	☐
6. Sobremesas lácteas: pudim flan, pudim de chocolate, etc	Um ou 1 prato de sobremesa	○	○	○	○	○	○	○	○	○	☐
7. Gelados	Um ou 2 bolas	○	○	○	○	○	○	○	○	○	☐

No grupo **II. OVOS, CARNES E PEIXES** - considere também as vezes que come cada um destes alimentos como elementos de outros pratos, por **exemplo**: o frango do arroz de frango, os ovos das omeletas, as salsichas dos cachorros.

II. OVOS, CARNES E PEIXES	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
8. Ovos	Um	○	○	○	○	○	○	○	○	○	☐
9. Frango	2 peças ou 1/4 de frango	○	○	○	○	○	○	○	○	○	☐
10. Peru, Coelho	1 porção ou 2 peças	○	○	○	○	○	○	○	○	○	☐
11. Carne: vaca, porco,cabrito	1 porção = 120g	○	○	○	○	○	○	○	○	○	☐
12. Figado de vaca, porco, frango	1 porção = 120g	○	○	○	○	○	○	○	○	○	☐
13. Língua, Mão de vaca, Tripas, Chispe, Coração, Rim	1 porção =100g	○	○	○	○	○	○	○	○	○	☐
14. Fiambre, Chouriço, Salpicão, Presunto, etc	2 fatias ou 3 rodelas	○	○	○	○	○	○	○	○	○	☐
15. Salsichas	3 médias	○	○	○	○	○	○	○	○	○	☐
16. Toucinho, Bacon	2 fatias	○	○	○	○	○	○	○	○	○	☐
17. Peixe gordo: sardinha, cavala, carapau, salmão, etc	1 porção =125g	○	○	○	○	○	○	○	○	○	☐
18. Peixe magro: pescada, faneca, dourada, etc	1 porção =125g	○	○	○	○	○	○	○	○	○	☐
19. Bacalhau	1 posta média	○	○	○	○	○	○	○	○	○	☐
20. Peixe conserva: atum, sardinhas,etc	1 lata	○	○	○	○	○	○	○	○	○	☐
21. Lulas, Polvo	1 porção = 100g	○	○	○	○	○	○	○	○	○	☐
22. Camarão, Amêijoas, Mexilhão, etc	1 prato de sobremesa	○	○	○	○	○	○	○	○	○	☐

No grupo **III. ÓLEOS E GORDURAS** – responda apenas ao que é **adicionado** em saladas, no prato, no pão, etc. e **não** considere a utilizada para cozinhar.

III. ÓLEOS E GORDURAS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
23. Azeite	1 colher de sopa	○	○	○	○	○	○	○	○	○	☐
24. Óleos: girassol, milho, soja	1 colher de sopa	○	○	○	○	○	○	○	○	○	☐
25. Margarina	1 colher de chá	○	○	○	○	○	○	○	○	○	☐
26. Manteiga	1 colher de chá	○	○	○	○	○	○	○	○	○	☐

No grupo **IV. PÃO, CEREAIS E SIMILARES –** não se esqueça de considerar também o que come fora das refeições, por exemplo: as batatas fritas da refeição e as que come fora das refeições.

IV. PÃO, CEREAIS E SIMILARES	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
27. Pão branco ou Tostas	Um ou 2 tostas	○	○	○	○	○	○	○	○	○	☐
28. Pão (ou tostas), integral,centeio, mistura	Um ou 2 tostas	○	○	○	○	○	○	○	○	○	☐
29. Broa, Broa de avintes	1 fatia = 80g	○	○	○	○	○	○	○	○	○	☐
30. Flocos cereais: muesli, corn-flakes, chocapic,etc.	1 chávena (sem leite)	○	○	○	○	○	○	○	○	○	☐
31. Arroz	½ prato	○	○	○	○	○	○	○	○	○	☐
32. Massas: esparguete, macarrão, etc.	½ prato	○	○	○	○	○	○	○	○	○	☐
33. Batatas fritas caseiras	½ prato	○	○	○	○	○	○	○	○	○	☐
34. Batatas fritas de pacote	1 pacote pequeno	○	○	○	○	○	○	○	○	○	☐
35. Batatas cozidas, assadas, estufadas e puré	2 batatas médias	○	○	○	○	○	○	○	○	○	☐

No grupo **V. DOCES E PASTÉIS –** no item 42 (açúcar) considere quantas colheres ou pacotes de açúcar adiciona aos alimentos.

V.DOCES E PASTÉIS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
36. Bolachas tipo maria, água e sal ou integrais	3 bolachas	○	○	○	○	○	○	○	○	○	☐
37. Outras bolachas ou Biscoitos	3 bolachas	○	○	○	○	○	○	○	○	○	☐
38. Croissant, Pasteis, Bolicao, Doughnut ou Bolos caseiros	Um; 1 fatia	○	○	○	○	○	○	○	○	○	☐
39.Chocolate (tablete ou em pó)	3 quadrado; 1 colher sopa	○	○	○	○	○	○	○	○	○	☐
40. Snacks de chocolate (Mars, Twix, Kit Kat, etc)	Um	○	○	○	○	○	○	○	○	○	☐
41. Marmelada, Compota, Geleia, Mel	1 colher sobremesa	○	○	○	○	○	○	○	○	○	☐
42. Açúcar	1 colher sobremesa; 1 pacote	○	○	○	○	○	○	○	○	○	☐

No grupo **VI. HORTALIÇAS E LEGUMES** – responda pensando nos que são **consumidos no prato** (cozidos ou em saladas) e **não** nos que entram na confecção da sopa. Nos que come só numa determinada época do ano não se esqueça de assinalar na coluna sazonal (X).

VI. HORTALIÇAS E LEGUMES	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
43. Couve branca, Couve lombarda	½ chávena	○	○	○	○	○	○	○	○	○	☐
44. Penca, Tronchuda	½ chávena	○	○	○	○	○	○	○	○	○	☐
45. Couve galega	½ chávena	○	○	○	○	○	○	○	○	○	☐
46. Brócolos	½ chávena	○	○	○	○	○	○	○	○	○	☐
47. Couve-flor, Couve-bruxelas	½ chávena	○	○	○	○	○	○	○	○	○	☐
48. Grelos, Nabiças, Espinafres	½ chávena	○	○	○	○	○	○	○	○	○	☐
49. Feijão verde	½ chávena	○	○	○	○	○	○	○	○	○	☐
50. Alface, Agrião	½ chávena	○	○	○	○	○	○	○	○	○	☐
51. Cebola	½ média	○	○	○	○	○	○	○	○	○	☐
52. Cenoura	1 média	○	○	○	○	○	○	○	○	○	☐
53. Nabo	1 médio	○	○	○	○	○	○	○	○	○	☐
54. Tomate fresco	3 rodelas	○	○	○	○	○	○	○	○	○	☐
55. Pimento	6 rodelas	○	○	○	○	○	○	○	○	○	☐
56. Pepino	¼ médio	○	○	○	○	○	○	○	○	○	☐
57. Leguminosas: feijão, grão de bico	1 chávena ou ½ prato	○	○	○	○	○	○	○	○	○	☐
58. Ervilha em grão, Fava	½ chávena ou ¼ prato	○	○	○	○	○	○	○	○	○	☐

No grupo **VII. FRUTOS** – recorde que para os alimentos que **só comeu em determinadas épocas do ano** (por exemplo, cerejas), deve assinalar as vezes em que comeu o alimento nessa época colocando um cruz (X) na última coluna (**sazonal**).

VII. FRUTOS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
59. Maça, pêra	1 média	○	○	○	○	○	○	○	○	○	☐
60. Laranja, Tangerinas	1 média; 2 médias	○	○	○	○	○	○	○	○	○	☐
61. Banana	1 média	○	○	○	○	○	○	○	○	○	☐
62. Kiwi	1 médio	○	○	○	○	○	○	○	○	○	☐
63. Morangos	1 chávena	○	○	○	○	○	○	○	○	○	☐
64. Cerejas	1 chávena	○	○	○	○	○	○	○	○	○	☐
65. Pêssego, Ameixa	1 médio; 3 médias	○	○	○	○	○	○	○	○	○	☐
66. Melão, Melancia	1 fatia média	○	○	○	○	○	○	○	○	○	☐
67. Diospiro	1 médio	○	○	○	○	○	○	○	○	○	☐
68. Figo fresco, Nêsperas,Damascos	3 médios	○	○	○	○	○	○	○	○	○	☐
69. Uvas frescas	1 cacho médio	○	○	○	○	○	○	○	○	○	☐
70. Frutos conserva: pêssego, ananás	2 metades ou rodelas	○	○	○	○	○	○	○	○	○	☐
71. Amêndoas, Avelãs, Nozes, Amendoins, Pistachio, etc.	½ chávena descascado	○	○	○	○	○	○	○	○	○	☐
72. Azeitonas	6 unidades	○	○	○	○	○	○	○	○	○	☐

No grupo **VIII. BEBIDAS E MISCELANEAS** – neste grupo **não** considere os sumos naturais (estes devem ser registados na tabela "**OUTROS ALIMENTOS**"), não se esqueça dos que são adicionados a outras bebidas, por exemplo: considere o café da meia de leite.

VIII. BEBIDAS E MISCELANEAS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
73. Vinho	1 copo =125ml	○	○	○	○	○	○	○	○	○	□
74. Cerveja	1 garrafa ou 1 lata	○	○	○	○	○	○	○	○	○	□
75. Bebidas brancas: whisky, aguardente, brandy, etc	1 cálice = 40 ml	○	○	○	○	○	○	○	○	○	□
76. Coca-cola, Pepsi-cola ou outras	1 garrafa ou 1 lata	○	○	○	○	○	○	○	○	○	□
77. Ice-tea	1 garrafa ou 1 lata	○	○	○	○	○	○	○	○	○	□
78.Outros refrigerantes, Sumos de fruta ou Néctares embalados	1 garrafa ou 1 copo	○	○	○	○	○	○	○	○	○	□
79.Café (incluindo o adicionado a outras bebidas)	1 chávena café	○	○	○	○	○	○	○	○	○	□
80. Chá preto e verde	1 chávena	○	○	○	○	○	○	○	○	○	□
81. Croquetes, Rissóis, Bolinhos de bacalhau, etc.	3 unidades	○	○	○	○	○	○	○	○	○	□
82. Maionese	1 colher sobremesa	○	○	○	○	○	○	○	○	○	□
83. Molho de tomate, ketchup	1 colher sopa	○	○	○	○	○	○	○	○	○	□
84. Pizza	Meia pizza-média	○	○	○	○	○	○	○	○	○	□
85. Hambúrguer	Um médio	○	○	○	○	○	○	○	○	○	□
86. Sopa de legumes	1 prato	○	○	○	○	○	○	○	○	○	□

Coloque neste quadro informação relativa aos restantes alimentos ou bebidas que não estejam na lista anterior e que tenha consumido pelo menos 1 vez por semana mesmo em pequenas quantidades, ou numa época em particular. Por exemplo, **farinha de pau, canja, alheiras, farinheiras, frutos secos** (figos, ameixas, alperces), **cevada**, etc.

OUTROS ALIMENTOS	Porção Média	Frequência alimentar									sazonal
		Nunca ou menos de 1 por mês	1 a 3 por mês	1 por semana	2 a 4 por semana	5 a 6 por semana	1 por dia	2 a 3 por dia	4 a 5 por dia	6 ou mais por dia	
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□
		○	○	○	○	○	○	○	○	○	□

Paffenbarger Physical Activity Questionnaire
Questionário de Atividade Física de Paffenbarger

Este questionário pretende conhecer os seus hábitos de atividade física. As questões referem-se ao tempo, em valores médios, que despende em atividade física por dia. Por favor responda às seguintes questões, baseando-se na média diária de **atividade física realizada no último mês**.

1. Quantos lances de escadas subiu **em média diariamente**, durante o último mês?
   _____ Lances de escadas por dia (1 lance=10 degraus; 1 andar=2 lances)

2. Quantos metros/quilómetros caminhou **em média diariamente**, durante o último mês?
   (Referência: o comprimento de um campo de futebol é equivalente a aprox. 100m)
   _____ metros/quilómetros por dia

3. Indique qualquer desporto ou atividade física de lazer em que tenha participado com regularidade durante o último mês. Identifique o número médio de vezes por semana que realizou essa atividade e a duração média das suas sessões. Inclua apenas o tempo em que foi fisicamente ativo/a (retire os intervalos).

Desporto ou Atividade Física de Lazer Realizada	**Nº de Vezes por semana**	**Duração da sessão (horas:minutos)**

Self-Determination Scale

Escala de Autodeterminação

As seguintes afirmações que estão agrupadas aos pares. Por favor, leia um par de cada vez, e decida qual das duas afirmações lhe parece mais próxima de si, nesta altura da sua vida. Assinale a sua escolha na escala de 5 pontos: 1 corresponde ao facto de só a afirmação A ser verdadeira para si e o 5 corresponde ao facto de só B ser verdadeiro para si. O 3 representa a pontuação se as duas afirmações lhe parecerem igualmente verdadeiras. Pode escolher qualquer número entre 1 e 5.

1. A) Sinto que sou sempre eu a escolher aquilo que faço
Só A) é verdadeira 1 2 3 4 5 **B) Por vezes sinto que não sou realmente eu a escolher aquilo que faço** Só B) é verdadeira

2. A) Por vezes sinto emoções que me são estranhas
Só A) é verdadeira 1 2 3 4 5 **B) As emoções que sinto são sempre minhas** Só B) é verdadeira

3. A) Faço tudo o que tenho que fazer por escolha própria
Só A) é verdadeira 1 2 3 4 5 **B) Eu faço tudo o que tenho que fazer, mas não sinto que seja realmente escolha minha** Só B) é verdadeira

4. A) Sinto que raramente sou eu própria
Só A) é verdadeira 1 2 3 4 5 **B) Sinto que posso sempre ser eu própria** Só B) é verdadeira

5. A) Eu faço aquilo que faço porque me interessa
Só A) é verdadeira 1 2 3 4 5 **B) Eu faço aquilo que faço porque tenho de o fazer** Só B) é verdadeira

6. A) Quando consigo algo, é frequente sentir que realmente não foi obra minha
Só A) é verdadeira 1 2 3 4 5 **B) Quando consigo algo, sinto que fui eu própria que o consegui** Só B) é verdadeira

7. A) Sinto-me livre para fazer o que quer que decida fazer
Só A) é verdadeira 1 2 3 4 5 **B) Frequentemente, o que faço não é aquilo que faria se pudesse escolher** Só B) é verdadeira

8. A) Por vezes sinto que o meu corpo me é estranho
Só A) é verdadeira 1 2 3 4 5 **B) Sinto sempre que o meu corpo é aquilo que eu sou** Só B) é verdadeira

9. A) Sinto-me bastante livre para fazer aquilo que escolhi fazer
Só A) é verdadeira 1 2 3 4 5 **B) Frequentemente faço coisas que não escolhi ter que fazer** Só B) é verdadeira

10. A) Por vezes, quando olho ao espelho, vejo uma estranha
Só A) é verdadeira 1 2 3 4 5 **B) Quando me olho ao espelho vejo-me a mim mesma** Só B) é verdadeira

Exercise Self-Regulation Questionnaire

Questionário de Autorregulação para o Exercício

Existem muitos motivos que levam a pessoa a fazer exercício regularmente. Por favor indique o grau com que cada um dos motivos seguintes o leva a fazer exercício regular.

	Nada Verdadeiro		Um Pouco Verdadeiro				Muito Verdadeiro
Tento fazer exercício regularmente							
1. Porque me sentiria mal comigo própria se não o fizesse.	1	2	3	4	5	6	7
2. Porque outras pessoas ficariam zangadas comigo se não o fizesse.	1	2	3	4	5	6	7
3. Porque gosto de fazer exercício.	1	2	3	4	5	6	7
4. Porque me sentiria uma falhada se não o fizesse	1	2	3	4	5	6	7
5. Porque sinto que é a melhor maneira de fazer algo por mim própria	1	2	3	4	5	6	7
6. Porque os outros pensariam que sou uma pessoa fraca se não o fizesse	1	2	3	4	5	6	7
7. Porque sinto que não tenho alternativas acerca do exercício; outras pessoas obrigam-me a fazer	1	2	3	4	5	6	7
8. Porque é um desafio, a obtenção dos meus objectivos	1	2	3	4	5	6	7
9. Porque acredito que o exercício ajuda-me a sentir melhor.	1	2	3	4	5	6	7
10. Porque é divertido	1	2	3	4	5	6	7
11. Porque tenho receio de arranjar problemas com os outros se não o fizesse.	1	2	3	4	5	6	7
12. Porque sinto que é importante para mim alcançar os meus objectivos.	1	2	3	4	5	6	7
13. Porque me sinto culpada se não fizer exercício regularmente	1	2	3	4	5	6	7
14. Porque quero que as outras pessoas saibam que estou a fazer o que me disseram que devia fazer.	1	2	3	4	5	6	7
15. Porque é interessante ver o meu próprio desenvolvimento	1	2	3	4	5	6	7
16. Porque sentir-me mais saudável é importante para mim.	1	2	3	4	5	6	7

Intrinsic Motivation Inventory

Inventário de Motivação Intrínseca

Por favor, responda a todas as questões da forma que melhor se aplica a si. Em cada uma delas existem cinco hipóteses de escolha.

	DISCORDO FORTEMENTE	DISCORDO	NÃO ESTOU SEGURO/A	CONCORDO	CONCORDO FORTEMENTE
1. Eu descrevo a Atividade Física como muito interessante	1	2	3	4	5
2. Acho que até sou bastante bom/a a praticar Atividade Física, comparado com outros	1	2	3	4	5
3. Esforço-me bastante nas Atividades Físicas	1	2	3	4	5
4. Sinto-me muito tenso/a por ter de praticar Atividade Física	1	2	3	4	5
5. É divertido praticar Atividade Física	1	2	3	4	5
6. Sinto-me muito competente depois de praticar Atividade Física durante algum tempo	1	2	3	4	5
7. Para mim é importante ter um bom desempenho na Atividade Física	1	2	3	4	5
8. Sinto-me pressionado/a pela ideia de fazer Atividade Física	1	2	3	4	5
9. Divirto-me muito quando me encontro em Atividade Física	1	2	3	4	5
10. Tenho bastante aptidão para a maioria das Atividades Físicas	1	2	3	4	5
11. Empenho-me bastante nas Atividades Físicas	1	2	3	4	5
12. Quando pratico Atividade Física geralmente sinto-me ansioso/a	1	2	3	4	5
13. As Atividades Físicas normalmente não costumam prender a minha atenção	1	2	3	4	5
14. Não me saí muito bem na última vez que tentei fazer Atividade Física	1	2	3	4	5
15. Geralmente não me esforço para fazer Atividade Física	1	2	3	4	5
16. Normalmente sinto-me descontraído/a ao fazer Atividade Física	1	2	3	4	5

Exercise Motives Inventory-2

Inventário de Motivos para o Exercício-2

Nas páginas seguintes encontram-se um conjunto de afirmações relacionadas com as **razões** que as pessoas frequentemente dão para **fazer exercício físico**. Independentemente de atualmente fazer exercício ou não, por favor leia cada afirmação cuidadosamente e indique, fazendo um círculo no número apropriado, se cada uma das afirmações é verdadeira ou falsa para si, ou se seria verdadeira para si se fizesse exercício físico. Se considera que uma afirmação **não é** de todo verdadeira para si, indique "0". Se pensa que uma afirmação **é** "muito verdadeira" para si, assinale "5". Se pensa que uma afirmação é parcialmente verdadeira para si, então assinale "1", "2", "3" ou "4", de acordo com o grau de veracidade de cada afirmação para si. **Pode escolher qualquer número entre 0 e 5**.

Lembre-se p.f.: Queremos saber porque razões você própria escolhe ou escolheria fazer exercício, e não se considera que as afirmações constituem boas razões para outros fazerem exercício.

		Nada Verdade para mim					Muito Verdade para mim
	Pessoalmente, eu faço exercício (ou faria exercício)						
1.	Para manter-me magra	0	1	2	3	4	5
2.	Para evitar doenças	0	1	2	3	4	5
3.	Porque faz-me sentir bem	0	1	2	3	4	5
4.	Para parecer mais jovem	0	1	2	3	4	5
5.	Para demonstrar aos outros o meu valor	0	1	2	3	4	5
6.	Para me dar tempo para pensar	0	1	2	3	4	5
7.	Para ter um corpo saudável	0	1	2	3	4	5
8.	Para ter mais força	0	1	2	3	4	5
9.	Porque gosto da sensação de me exercitar	0	1	2	3	4	5
10.	Para passar tempo com os amigos	0	1	2	3	4	5
11.	Porque o meu médico aconselhou-me a fazer exercício	0	1	2	3	4	5
12.	Porque gosto de tentar ganhar nas atividades desportivas	0	1	2	3	4	5
13.	Para ser/tornar-me mais ágil	0	1	2	3	4	5
14.	Para ter objectivos para atingir	0	1	2	3	4	5
15.	Para perder peso	0	1	2	3	4	5
16.	Para prevenir problemas de saúde	0	1	2	3	4	5
17.	Porque acho que o exercício é revigorante	0	1	2	3	4	5
18.	Para ter um bom corpo	0	1	2	3	4	5
19.	Para comparar as minhas capacidades com as de outras pessoas	0	1	2	3	4	5
20.	Porque ajuda a reduzir a tensão	0	1	2	3	4	5
21.	Porque quero manter uma boa saúde	0	1	2	3	4	5
22.	Para aumentar a minha resistência	0	1	2	3	4	5
23.	Porque fazer exercício é gratificante em si mesmo	0	1	2	3	4	5
24.	Para gozar os aspectos sociais do exercício	0	1	2	3	4	5
25.	Para ajudar a prevenir uma doença que corre na minha família	0	1	2	3	4	5

26. Porque gosto de competir 0 1 2 3 4 5
27. Para manter a flexibilidade nos meus músculos 0 1 2 3 4 5
28. Para ter desafios para vencer 0 1 2 3 4 5
29. Para ajudar a controlar o peso 0 1 2 3 4 5
30. Para evitar doenças do coração 0 1 2 3 4 5
31. Para "recarregar as baterias" 0 1 2 3 4 5
32. Para melhorar a minha aparência 0 1 2 3 4 5
33. Para ser reconhecido pelos meus feitos 0 1 2 3 4 5
34. Para ajudar a controlar o stress 0 1 2 3 4 5
35. Para me sentir mais saudável 0 1 2 3 4 5
36. Para ser mais forte fisicamente 0 1 2 3 4 5
37. Para gozar a experiência de fazer exercício 0 1 2 3 4 5
38. Para me divertir e ser ativa com outras pessoas 0 1 2 3 4 5
39. Para me ajudar a recuperar de uma doença ou lesão 0 1 2 3 4 5
40. Porque gosto da competição física ou desportiva 0 1 2 3 4 5
41. Para ser/tornar-me mais flexível (para ficar com músculos mais flexíveis) 0 1 2 3 4 5
42. Para desenvolver competências pessoais 0 1 2 3 4 5
43. Porque o exercício me ajuda a queimar calorias 0 1 2 3 4 5
44. Para parecer mais atraente 0 1 2 3 4 5
45. Para conseguir coisas que os outros não são capazes 0 1 2 3 4 5
46. Para aliviar a tensão 0 1 2 3 4 5
47. Para desenvolver os músculos 0 1 2 3 4 5
48. Porque me sinto no meu melhor quando me exercito 0 1 2 3 4 5
49. Para fazer novos amigos 0 1 2 3 4 5
50. Porque as atividades físicas são divertidas especialmente quando envolve competição 0 1 2 3 4 5
51. Para me comparar comigo mesma 0 1 2 3 4 5

Self-Efficacy for Exercise Behaviors Scale

Escala de Autoeficácia para o Exercício

Por favor classifique qual o **grau de confiança** com que realmente seria capaz de se **motivar a si própria** para fazer coisas como estas consistentemente, pelo menos durante SEIS MESES.

	De certeza que não seria capaz	Provavelmente não seria capaz	Não tenho a certeza	Provavelmente seria capaz	De certeza que seria capaz
1. Manter-me num programa de exercício quando a família/amigos estão a exigir mais tempo para eles próprios.	1	2	3	4	5
2. Manter-me num programa de exercício quando tenho rotinas diárias para fazer.	1	2	3	4	5
3. Manter-me num programa de exercício quando me exigem excessivamente no trabalho ou escola.	1	2	3	4	5
4. Manter-me num programa de exercício quando tenho obrigações sociais que consomem muito tempo.	1	2	3	4	5
5. Ler ou estudar menos para poder fazer mais exercício.	1	2	3	4	5
6. Manter-me num programa de exercício depois de um longo e cansativo dia no trabalho ou na escola.	1	2	3	4	5
7. Manter-me num programa de exercício mesmo quando me estou a sentir deprimida.	1	2	3	4	5
8. Arranjar tempo para um programa de atividade física.	1	2	3	4	5
9. Continuar a fazer exercício com outras pessoas mesmo quando elas parecem muito rápidas ou muito lentas para mim.	1	2	3	4	5
10. Manter-me num programa de exercício durante uma alteração importante na minha vida (por exemplo, morte de um familiar, mudar de casa).	1	2	3	4	5

Exercise Perceived Barriers Scale

Escala de Percepção de Barreiras para o Exercício

Para si, uma importante barreira para a realização de exercício ou atividade física é:

	DISCORDO ABSOLUTAMENTE	DISCORDO	NÃO CONCORDO NEM DISCORDO	CONCORDO	CONCORDO ABSOLUTAMENTE
1. Estou cheia de trabalho.	1	2	3	4	5
2. O exercício interfere com a escola ou trabalho.	1	2	3	4	5
3. Não tenho tempo suficiente.	1	2	3	4	5
4. Sou muito preguiçosa.	1	2	3	4	5
5. Não tenho motivação suficiente.	1	2	3	4	5
6. Estou muito cansada.	1	2	3	4	5
7. Estou demasiado fatigada com o exercício.	1	2	3	4	5
8. O exercício é aborrecido para mim.	1	2	3	4	5
9. O exercício é muito inconveniente.	1	2	3	4	5
10. Tenho uma limitação por razões de saúde.	1	2	3	4	5
11. Tenho demasiadas obrigações familiares.	1	2	3	4	5

Figure Rating Scale

Escala de Imagem Corporal

1. Utilize as silhuetas para responder às seguintes questões:

a) Qual a figura que mais se assemelha ao peso adulto médio da sua mãe? _____

b) Qual a figura que mais se assemelha ao peso adulto médio do seu pai? _____

c) Qual a figura que melhor representa a sua silhueta ACTUAL? _____

d) Qual a figura que melhor representa a sua silhueta IDEAL? _____

Body Shape Questionnaire

Questionário da Forma Corporal

Estamos interessados em saber como se tem **sentido acerca da sua aparência** DURANTE AS ÚLTIMAS QUATRO SEMANAS. Por favor leia cada afirmação e assinale com um círculo o número mais adequado.

	NAS ÚLTIMAS QUATRO SEMANAS...	NUNCA	RARAMENTE	ALGUMAS VEZES	BASTANTES VEZES	MUITAS VEZES	SEMPRE
1.	Em alturas em que estava sem nada para fazer, deu por si a pensar na sua figura?	1	2	3	4	5	6
2.	Sentiu-se tão preocupada acerca da sua figura que achou que devia fazer dieta?	1	2	3	4	5	6
3.	Pensou que as suas coxas, anca e nádegas são demasiado grandes para o resto do seu corpo?	1	2	3	4	5	6
4.	Sentiu receio de ficar "gorda" (ou mais "gorda" do que é)?	1	2	3	4	5	6
5.	Preocupou-se com a pouca firmeza do seu corpo?	1	2	3	4	5	6
6.	Sentiu-se cheia (depois de uma grande refeição) o que a levou a achar-se "gorda"?	1	2	3	4	5	6
7.	Sentiu-se tão mal acerca da sua figura que chorou?	1	2	3	4	5	6
8.	Evitou correr porque a sua pele e gordura poderiam abanar demasiado?	1	2	3	4	5	6
9.	Esteve com mulheres magras o que a faz sentir alguma vergonha pela sua figura?	1	2	3	4	5	6
10.	Preocupou-se acerca das suas coxas ocuparem muito espaço ("espalharem-se") quando sentada?	1	2	3	4	5	6
11.	Sentiu-se "gorda" depois de comer mesmo uma pequena porção de comida?	1	2	3	4	5	6
12.	Reparou na figura de outras mulheres e sentiu que a sua figura era pior do que a delas?	1	2	3	4	5	6
13.	Notou que ao pensar na sua figura, isto interferiu com a sua capacidade de concentração (ao ver TV, ler ou ao conversar)?	1	2	3	4	5	6
14.	Sentiu-se "gorda" quando estava nua, por exemplo, ao tomar banho?	1	2	3	4	5	6
15.	Evitou vestir roupas que a fazem especialmente consciente da figura do seu corpo?	1	2	3	4	5	6

16.	Imaginou-se a cortar partes mais gordas (maiores) do seu corpo?	1	2	3	4	5	6
17.	Sentiu-se "gorda" após comer doces, bolos ou outras comidas com muitas calorias?	1	2	3	4	5	6
18.	Deixou de ir a eventos sociais (ex. festas) porque se sentiu mal acerca da sua figura?	1	2	3	4	5	6
19.	Sentiu-se excessivamente grande e roliça/rechonchuda?	1	2	3	4	5	6
20.	Sentiu vergonha do seu corpo?	1	2	3	4	5	6
21.	Fez dieta (restringiu comida) pois estava preocupada com a sua figura?	1	2	3	4	5	6
22.	Sentiu-se mais feliz acerca da sua figura quando o seu estômago estava vazio?	1	2	3	4	5	6
23.	Pensou que tem a figura que tem porque lhe falta capacidade de autocontrolo?	1	2	3	4	5	6
24.	Preocupou-se em não deixar outras pessoas verem "pneus" na zona da sua barriga?	1	2	3	4	5	6
25.	Sentiu que não é justo que outras mulheres sejam mais magras que você?	1	2	3	4	5	6
26.	Vomitou de modo a ser ou sentir-se mais magra?	1	2	3	4	5	6
27.	Quando estava acompanhada preocupou-se em ocupar demasiado espaço (ex.: num sofá ou lugar de autocarro)?	1	2	3	4	5	6
28.	Preocupou-se com o facto da sua pele/gordura ser demasiado mole e abanar?	1	2	3	4	5	6
29.	Sentiu-se mal acerca da sua figura ao ver a sua imagem reflectida (ex.: espelho ou vidro numa loja)?	1	2	3	4	5	6
30.	Beliscou partes do seu corpo para ver quanta gordura lá tem?	1	2	3	4	5	6
31.	Evitou situações onde as pessoas podem ver o seu corpo (balneários comuns ou piscinas públicas)?	1	2	3	4	5	6
32.	Tomou laxativos (produtos para ir à WC mais vezes) para se sentir ou ser mais magra?	1	2	3	4	5	6
33.	Sentiu-se especialmente preocupada/envergonhada na sua figura na companhia de outras pessoas?	1	2	3	4	5	6
34.	Pensou que devia fazer exercício ao sentir-se preocupada com a sua figura?	1	2	3	4	5	6

Rosenberg Self-Concept/Self-Esteem Scale

Escala de Autoestima/Autoconceito de Rosenberg

Segue-se uma lista de afirmações acerca da forma como você considera que é.

Se CONCORDAR FORTEMENTE, faça um círculo em CF.
Se CONCORDA com a afirmação, faça um círculo em C.
Se DISCORDA, faça um círculo em D.
Se DISCORDA FORTEMENTE, faça um círculo em DF

	DISCORDO FORTEMENTE	DISCORDO	CONCORDO	CONCORDO FORTEMENTE
1. Sinto que sou uma boa pessoa – pelo menos tão boa como outras.	DF	D	C	CF
2. Tenho um grande número de boas qualidades.	DF	D	C	CF
3. Levando tudo em conta, sinto-me uma pessoa falhada.	DF	D	C	CF
4. Sou capaz de fazer as coisas tão bem como a maior parte das pessoas.	DF	D	C	CF
5. Sinto que não tenho muito por que me orgulhar.	DF	D	C	CF
6. Tenho uma atitude positiva em relação a mim próprio/a.	DF	D	C	CF
7. Globalmente estou satisfeito comigo próprio/a.	DF	D	C	CF
8. Desejava ter mais respeito por mim mesmo.	DF	D	C	CF
9. Às vezes sinto-me mesmo inútil.	DF	D	C	CF
10. Às vezes penso que não presto para nada.	DF	D	C	CF

Physical Self-Perception Profile Questionnaire

Questionário de Perfil de Auto-Percepção Corporal

Instruções:
Estas afirmações permitem que as pessoas se autodescrevam.
Não há respostas certas ou erradas, uma vez que as pessoas são todas diferentes.
Primeiro, decida qual das duas afirmações melhor a descreve. A seguir, junto da afirmação que escolheu assinale se a mesma é parcialmente verdadeira para si ou totalmente verdadeira para si.

EXEMPLO

Totalmente verdadeiro para mim	Parcialmente verdadeiro para mim				Parcialmente verdadeiro para mim	Totalmente verdadeiro para mim
☐	☐	Algumas pessoas são muito competitivas	MAS	Outras não são tão competitivas	☒	☐

Questionário

Totalmente verdadeiro para mim	Parcialmente verdadeiro para mim				Parcialmente verdadeiro para mim	Totalmente verdadeiro para mim
1. ☐	☐	Algumas pessoas acham que não são muito boas no que diz respeito à prática desportiva	MAS	Outras sentem que são realmente boas em praticamente todos os desportos	☐	☐
2. ☐	☐	Algumas pessoas não revelam muita confiança no seu nível de condição física	MAS	Outras sentem-se sempre confiantes na manutenção de uma excelente condição física	☐	☐
3. ☐	☐	Algumas pessoas acham que, quando comparadas com a maioria, têm um corpo atraente	MAS	Outras acham que, quando comparadas com a maioria, os seus corpos não são tão atraentes	☐	☐
4. ☐	☐	Algumas pessoas acham que são fisicamente mais fortes que a maioria das pessoas do seu sexo	MAS	Outras acham que lhes falta força física comparando-se com outras pessoas do seu sexo	☐	☐
5. ☐	☐	Algumas pessoas sentem-se extremamente orgulhosas de serem quem são e daquilo que conseguem realizar fisicamente	MAS	Outras, por vezes, não se sentem tão orgulhosas do que são fisicamente	☐	☐
6. ☐	☐	Algumas pessoas acham que estão entre as melhores no que se refere à capacidade desportiva	MAS	Outras acham que não estão entre as mais aptas no que se refere à prática desportiva	☐	☐

7.	☐	☐	Algumas pessoas fazem questão de praticar regularmente alguma forma de exercício vigoroso	MAS	Outras, por vezes, conseguem manter um exercício físico regular e vigoroso	☐ ☐
8.	☐	☐	Algumas pessoas acham que têm dificuldade em manter um corpo atraente	MAS	Outras acham que são capazes de manter facilmente o seu corpo atraente	☐ ☐
9.	☐	☐	Algumas pessoas acham que os seus músculos são muito mais fortes do que a maioria das pessoas do seu sexo	MAS	Outras acham que, em geral, os seus músculos não são tão fortes como os da maioria das pessoas do seu sexo	☐ ☐
10.	☐	☐	Algumas pessoas, por vezes, não se sentem felizes por serem como são ou com o que conseguem fazer fisicamente	MAS	Outras sentem-se sempre felizes consigo próprias a nível físico	☐ ☐
11.	☐	☐	Algumas pessoas não são muito confiantes no que se refere a participar em atividades desportivas	MAS	Outras são das mais confiantes no que se refere a participar em atividades desportivas	☐ ☐
12.	☐	☐	Algumas pessoas normalmente não têm um elevado nível de resistência e condição física	MAS	Outras mantêm sempre um elevado nível de resistência e condição física	☐ ☐
13.	☐	☐	Algumas pessoas sentem vergonha do seu corpo quando usam poucas roupas	MAS	Outras não se sentem envergonhadas com o seu corpo quando usam poucas roupas	☐ ☐
14.	☐	☐	Quando se trata de situações que requerem força, algumas pessoas estão entre as primeiras a avançar	MAS	Outras, em situações que requerem força, estão entre as últimas a avançar	☐ ☐
15.	☐	☐	Quando se trata da sua faceta corporal, algumas pessoas não se sentem muito confiantes	MAS	Outras parecem estar sempre confiantes em relação à sua faceta corporal	☐ ☐
16.	☐	☐	Algumas pessoas acham que são sempre das melhores quando se trata de se integrar em atividades desportivas	MAS	Outras acham que não são das melhores quando se trata de se integrar em atividades desportivas	☐ ☐
17.	☐	☐	Algumas pessoas têm tendência a sentirem-se pouco à vontade em contextos de exercício	MAS	Outras sentem-se sempre confiantes e à vontade em contextos de exercício	☐ ☐

18.	☐	☐	Algumas pessoas sentem que são frequentemente admiradas porque o seu corpo é considerado atraente	MAS	Outras, raramente, sentem que são admiradas pela aparência do seu corpo	☐ ☐
19.	☐	☐	Algumas pessoas tendem a não ter confiança na sua força física	MAS	Outras são extremamente confiantes na sua força física	☐ ☐
20.	☐	☐	Algumas pessoas têm sempre uma opinião positiva acerca da sua faceta corporal	MAS	Outras não têm, por vezes, uma opinião positiva acerca da sua faceta corporal	☐ ☐
21.	☐	☐	Algumas pessoas são, por vezes, um pouco mais lentas do que a maioria a aprender novas habilidades numa situação desportiva	MAS	Outras parecem estar sempre entre as mais rápidas quando se trata de aprender novas habilidades desportivas	☐ ☐
22.	☐	☐	Algumas pessoas sentem-se extremamente confiantes na sua capacidade em manter uma prática regular de exercício e na manutenção da condição física	MAS	Outras não se sentem tão confiantes na sua capacidade em manter uma prática regular de exercício e na manutenção da condição física	☐ ☐
23.	☐	☐	Algumas pessoas acham que, quando comparadas com a maioria, o seu corpo não aparenta estar na sua melhor forma	MAS	Outras, quando comparadas com a maioria acham que o seu corpo parece estar sempre em excelente forma física	☐ ☐
24.	☐	☐	Algumas pessoas, quando comparadas com a maioria, acham que são muito fortes e têm músculos bem desenvolvidos	MAS	Outras acham que não são tão fortes e que os seus músculos não estão muito bem desenvolvidos	☐ ☐
25.	☐	☐	Algumas pessoas desejariam ter mais respeito pelo seu "eu corporal"	MAS	Outras têm sempre grande respeito pelo seu "eu corporal"	☐ ☐
26.	☐	☐	Tendo oportunidade, algumas pessoas são sempre das primeiras a aderir às atividades desportivas	MAS	Outras pessoas, por vezes, retraem-se e não são habitualmente das primeiras a aderir ao desporto	☐ ☐
27.	☐	☐	Algumas pessoas, quando comparadas com a maioria, acham que mantêm sempre um elevado nível de condição física	MAS	Outras, quando comparadas com a maioria, acham que o seu nível de condição física normalmente não é elevado	☐ ☐

28.	☐ ☐	Algumas pessoas são extremamente confiantes na aparência do seu corpo	MAS	Outras são pouco seguras da aparência do seu corpo	☐ ☐	
29.	☐ ☐	Algumas pessoas acham que não são tão boas como a maioria a lidar com situações que requerem força	MAS	Outras acham que estão entre as melhores a lidar com situações que requerem força física	☐ ☐	
30.	☐ ☐	Algumas pessoas, a nível físico, sentem-se extremamente satisfeitas com o tipo de pessoa que são	MAS	Outras, por vezes, sentem-se um pouco insatisfeitas com o seu "eu corporal"	☐ ☐	

Social Support for Exercise Survey

Inquérito de Suporte Social para o Exercício

Por favor assinale com um círculo à volta do número que melhor indica qual a frequência com que a sua família (que vivem em sua casa) ou os seus amigos (amigos, conhecidos ou colegas de trabalho) fizeram ou disseram o que está descrito em cada item, nos últimos seis meses.

	NUNCA	OCASIONAL-MENTE	ALGUMAS VEZES	FREQUENTE-MENTE	MUITAS VEZES
1. Fizeram ou ofereceram-se para fazer exercício comigo.	1	2	3	4	5
2. Ajudaram-me a relembrar ou encorajaram-me no iniciar/manter o meu programa de exercício.	1	2	3	4	5
3. Alteraram as suas rotinas para que pudéssemos fazer exercício juntos.	1	2	3	4	5
4. Planearam fazer atividade física em momentos de recreação.	1	2	3	4	5
5. Discutiram comigo acerca de exercício.	1	2	3	4	5
6. Ajudaram a planear atividades sobre o meu exercício.	1	2	3	4	5
7. Perguntaram-me por ideias sobre como eles podem fazer mais atividade física.	1	2	3	4	5
8. Responsabilizaram-se por rotinas diárias para que eu tivesse mais tempo para o exercício.	1	2	3	4	5
9. Fizeram comentários positivos acerca da minha aparência física.	1	2	3	4	5
10. Zangaram-se comigo por fazer exercício.	1	2	3	4	5
11. Criticaram-me ou gozaram comigo por fazer exercício.	1	2	3	4	5

Beck Depression Inventory

Inventário de Depressão de Beck

Este questionário é composto por 21 grupos de afirmações. Por favor leia cada grupo de afirmações cuidadosamente e depois escolha **uma afirmação**, em cada grupo, que melhor descreva a forma como se tem sentido nas **duas últimas semanas, incluindo o dia de hoje.** Faça um círculo à volta do número correspondente à afirmação que selecionou. Se lhe parecer que diversas frases do mesmo grupo se aplicam igualmente bem, coloque o círculo à volta do número mais elevado para esse grupo. Assegure-se de que não escolhe mais do que uma frase em cada grupo, inclusive no Item 16 (Mudanças no Padrão de Sono) ou no Item 18 (Mudanças no Apetite).

1. Tristeza
Não me sinto triste 0
Sinto-me triste a maior parte do tempo 1
Estou sempre triste 2
Estou tão triste ou infeliz que não aguento mais 3

2. Pessimismo
Não estou pessimista em relação ao meu futuro 0
Sinto-me mais pessimista acerca do meu futuro do que era normal 1
Não espero que as coisas se vão resolver em meu benefício 2
Não tenho esperança no meu futuro e penso que ainda irá piorar 3

3. Fracassos do passado
Não me sinto um falhado/a 0
Fracassei mais do que deveria 1
Quando olho para o meu passado, vejo imensos fracassos 2
Como pessoa, sinto-me completamente falhado/a 3

4. Perda de prazer
Sinto a mesma satisfação de sempre, com as coisas de que gosto 0
Não gosto tanto das coisas como gostava antes 1
Obtenho muito pouco prazer das coisas de que costumava gostar 2
Não consigo ter qualquer prazer com as coisas de que costumava gostar 3

5. Sentimentos de culpa
Não me sinto particularmente culpado/a 0
Sinto-me culpado/a com muitas coisas que fiz ou que devia ter feito 1
Sinto-me culpado/a a maior parte do tempo 2
Sinto-me constantemente culpado/a 3

6. Sentimentos de punição
Não sinto que esteja a ser punido/a 0
Sinto que talvez venha a ser punido/a 1
Espero vir a ser punido/a 2
Sinto que estou a ser punido/a 3

7. Auto-desvalorização
O que sinto acerca de mim próprio/a não se tem alterado 0
Perdi a confiança em mim 1
Estou desiludido comigo próprio/a 2
Não gosto de mim 3

8. Autocrítica
Não me critico ou culpo mais do que o habitual 0
Sou mais crítico/a de mim próprio/a do que era habitual 1
Critico-me por todos os meus erros 2
Culpo-me por todo o mal que acontece 3

9. Pensamentos ou desejos suicidas
Não tenho pensamentos suicidas 0
Tenho pensamentos suicidas, mas nunca os levaria à prática 1
Gostaria de me suicidar 2
Se tivesse oportunidade matava-me 3

10. Chorar
Não choro mais do que chorava 0
Choro mais do que costumava chorar 1
Choro por tudo e por nada 2
Tenho vontade de chorar mas não consigo 3

11. Agitação
Não estou mais inquieto/a ou agitado/a do que o normal 0
Sinto-me mais inquieto/a ou agitado/a do que o normal 1
Estou tão inquieto/a ou agitado/a que é difícil ficar parado/a 2
Estou tão inquieto/a ou agitado/a que tenho de estar sempre a mexer-me ou a fazer alguma coisa 3

12. Perda de interesse
Não perdi o interesse nas outras pessoas ou atividades 0
Estou menos interessado nas outras pessoas ou coisas do que era habitual 1
Perdi a maior parte do interesse nas outras pessoas ou coisas 2
É muito difícil interessar-me por alguma coisa 3

13. Indecisão
Tomo decisões tão bem como sempre 0
Sinto mais dificuldade em tomar decisões do que é normal 1
Tenho muito mais dificuldade em tomar decisões do que antes 2
Tenho problemas em tomar qualquer decisão 3

14. Sentimento de inutilidade
Não sinto que seja um/uma inútil ou uma pessoa sem valor 0
Não considero que tenha tanto valor e utilidade como dantes 1
Sinto que tenho menos valor quando me comparo com outras pessoas 2
Sinto-me completamente inútil e sem valor 3

15. Perda de energia
Tenho tanta energia como sempre 0
Tenho menos energia do que era habitual 1
Não tenho energia para fazer muita coisa 2
Não tenho energia para o que quer que seja 3

16. Alterações no ritmo de sono
Não tenho notado qualquer mudança no meu padrão de sono 0
Durmo um pouco mais/menos do que o costume 1
OU
Durmo muito mais/menos do que o costume 2
Durmo a maior parte do dia 3
Acordo 1-2 horas mais cedo e não consigo voltar a adormecer 3

17. Irritabilidade
Não estou mais irritável do que o normal 0
Estou mais irritável do que o normal 1
Estou muito mais irritável do que o normal 2
Estou sempre irritável 3

18. Mudanças no apetite
Não noto qualquer mudança no meu apetite 0
O meu apetite é um pouco menor do que o normal 1
OU
O meu apetite é um pouco maior do que o normal 1
O meu apetite é muito menor do que antes 2
OU
O meu apetite é muito maior do que antes 2
Não tenho nenhum apetite 3
Estou constantemente com vontade de comer 3

19. Dificuldade de concentração
Consigo-me concentrar tão bem como sempre 0
Não me consigo concentrar tão bem como o habitual 1
É difícil concentrar-me nalguma coisa durante muito tempo 2
Acho que não me consigo concentrar em nada 3

20. Cansaço ou falta de energia
Não me sinto mais cansado ou sem energia do que o normal 0
Fico cansado ou sem energia mais facilmente do que o normal 1
Sinto-me demasiado cansado ou sem energia para fazer muitas das coisas que costumava fazer 2
Sinto-me demasiado cansado ou sem energia para fazer a maior parte das coisas que costumava fazer 3

21. Perda de interesse em sexo
Não notei qualquer mudança recente no meu interesse por sexo 0
Tenho menos interesse por sexo do que era habitual 1
Atualmente estou muito menos interessado em sexo 2
Perdi completamente o interesse por sexo 3

Short-Form Health Survey

Inquérito de Qualidade de Vida relacionada com a Saúde

Acerca destas perguntas:
As questões que se seguem pedem-lhe opinião sobre a sua saúde, a forma como se sente e sobre a capacidade de desempenhar as atividades habituais. Pedimos que leia com atenção cada pergunta e responda o mais honestamente possível. Se não tiver a certeza sobre a resposta a dar, dê-nos a que achar mais apropriada e, se quiser, escreva um comentário a seguir à pergunta. A informação que nos der nunca será usada de modo a poder ser identificado/a.

Para as perguntas 1 e 2, por favor coloque um círculo no número que melhor descreve a sua saúde.

1 – Em geral, diria que a sua saúde é:

Óptima	Muito boa	Boa	Razoável	Fraca
1	2	3	4	5

2 – Comparando com o que acontecia há um ano, como descreve o seu estado geral atual:

Muito melhor	Com algumas melhoras	Aproximadamente igual	Um pouco pior	Muito pior
1	2	3	4	5

3 – As perguntas que se seguem são sobre atividades que executa no seu dia-a-dia. Será que a sua saúde o/a limita nestas atividades? Se sim, quanto? (por favor assinale com um círculo um número em cada linha)

	Sim muito limitado/a	Sim, um pouco limitado/a	Não, nada limitado/a
3.1. Atividades violentas, tais como correr, levantar pesos, participar em desportos violentos	1	2	3
3.2. Atividades moderadas, tais como deslocar uma mesa ou aspirar a casa	1	2	3
3.3. Levantar ou carregar as compras da mercearia	1	2	3
3.4. Subir vários lanços de escada	1	2	3
3.5. Subir um lanço de escadas	1	2	3
3.6. Inclinar-se, ajoelhar-se ou baixar-se	1	2	3
3.7. Andar mais de 1 Km	1	2	3
3.8. Andar vários quarteirões	1	2	3
3.9. Andar um quarteirão	1	2	3
3.10. Tomar banho ou vestir-se sozinho/a	1	2	3

4 – Durante as últimas semanas teve, no seu trabalho ou atividades diárias, alguns problemas apresentados a seguir como consequência do seu estado de saúde físico? (por favor, em cada linha ponha um círculo à volta do número 1, se for sim, e à volta do número 2, se a resposta for não)

	Sim	Não
4.1. Diminuiu o tempo gasto a trabalhar, ou noutras atividades	1	2
4.2. Fez menos do que queria	1	2
4.3. Sentiu-se limitado/a no tipo de trabalho ou outras atividades	1	2
4.4. Teve dificuldade em executar o seu trabalho ou outras atividades (por exemplo, foi preciso mais esforço)	1	2

5 . Durante as últimas 4 semanas, teve com o seu trabalho ou com as suas atividades diárias, algum dos problemas apresentados a seguir devido a quaisquer problemas emocionais (tal como sentir-se deprimido/a ou ansioso/a) (por favor, em cada linha ponha um círculo à volta do numero 1, se for sim, e à volta do número 2, se a resposta for não)

	Sim	Não
5.1. Diminuiu o tempo gasto a trabalhar, ou noutras atividades	1	2
5.2. Fez menos do que queria	1	2
5.3. Não executou o trabalho ou outras atividades tão cuidadosamente como era costume	1	2

6 – Durante as últimas 4 semanas, em que medida é que a sua saúde física ou problemas emocionais interferiram com o seu relacionamento social normal com a família, amigos, vizinhos ou outras pessoas? (Assinale com um círculo a sua resposta)

Absolutamente nada	Pouco	Moderadamente	Bastante	Imenso
1	2	3	4	5

7 – Durante as últimas quatro semanas teve dores? (Assinale com um círculo a sua resposta)

Nenhumas	Muito fracas	Ligeiras	Moderadas	Fortes	Muito fortes
1	2	3	4	5	6

8 – Durante as últimas 4 semanas, de que forma é que a dor interferiu com o seu trabalho normal (tanto o trabalho fora de casa como o trabalho doméstico)? (Assinale com um círculo a sua resposta)

Absolutamente nada	Pouco	Moderadamente	Bastante	Imenso
1	2	3	4	5

9 – As perguntas que se seguem pretendem avaliar a forma como se sentiu e como lhe correram as coisas nas últimas 4 semanas. Para cada pergunta, coloque por favor um círculo à volta do número que melhor descreva a forma como se sentiu. Certifique-se que coloca um círculo em cada linha.

Quanto tempo, nas últimas 4 semanas …	Sempre	A maior parte do tempo	Bastante tempo	Algum tempo	Pouco tempo	Nunca
9.1. Se sentiu cheio/a de vitalidade?	1	2	3	4	5	6
9.2. Se sentiu muito nervoso/a?	1	2	3	4	5	6
9.3. Se sentiu tão deprimido/a que nada o/a animava?	1	2	3	4	5	6
9.4. Se sentiu calmo/a e tranquilo/a?	1	2	3	4	5	6
9.5. Se sentiu com muita energia?	1	2	3	4	5	6
9.6. Se sentiu triste e em baixo?	1	2	3	4	5	6
9.7. Se sentiu estafado/a?	1	2	3	4	5	6
9.8. Se sentiu feliz?	1	2	3	4	5	6
9.9. Se sentiu cansado/a	1	2	3	4	5	6

10 – Durante as últimas 4 semanas, até que ponto é que a sua saúde física ou problemas emocionais limitaram a sua atividade social (tal como visitar amigos ou familiares próximos)?

Sempre	A maior parte do tempo	Algum tempo	Pouco tempo	Nunca
1	2	3	4	5

11 – Por favor, diga em que medida são verdadeiras ou falsas as seguintes afirmações. (Assinale com um círculo a sua resposta)

	Absolutamente verdade	Verdade	Não sei	Falso	Absolutamente falso
11.1. Parece que adoeço mais facilmente do que os outros.	1	2	3	4	5
11.2. Sou tão saudável como qualquer outra pessoa	1	2	3	4	5
11.3. Estou convencido/a que a minha saúde vai piorar	1	2	3	4	5
11.4. A minha saúde é óptima	1	2	3	4	5

Impact of Weight on Quality of Life

Impacto do Peso na Qualidade de Vida

Responda às afirmações seguintes assinalando com um círculo o número que corresponde melhor ao seu caso, na semana passada. Seja o mais franco/a possível. Não existem respostas certas nem erradas.

Função física		SEMPRE VERDADE	GERALMENTE VERDADE	ALGUMAS VEZES VERDADE	RARAMENTE VERDADE	NUNCA VERDADE
1	Devido ao meu peso, tenho dificuldade em apanhar objetos.	1	2	3	4	5
2	Devido ao meu peso, tenho dificuldade em atar os sapatos.	1	2	3	4	5
3	Devido ao meu peso, tenho dificuldade em levantar-me de cadeiras.	1	2	3	4	5
4	Devido ao meu peso, tenho dificuldade em subir e descer escadas.	1	2	3	4	5
5	Devido ao meu peso, tenho dificuldade em vestir-me e despir-me.	1	2	3	4	5
6	Devido ao meu peso, tenho problemas de mobilidade.	1	2	3	4	5
7	Devido ao meu peso, tenho dificuldade em cruzar as pernas.	1	2	3	4	5
8	Sinto falta de ar mesmo com qualquer mínimo exercício.	1	2	3	4	5
9	Sofro de dores ou rigidez nas minhas articulações.	1	2	3	4	5
10	Os meus tornozelos e a parte inferior das pernas incham no final do dia.	1	2	3	4	5
11	Estou preocupado/a com a minha saúde.	1	2	3	4	5
Autoestima		SEMPRE VERDADE	GERALMENTE VERDADE	ALGUMAS VEZES VERDADE	RARAMENTE VERDADE	NUNCA VERDADE
12	Devido ao meu peso, sinto um peso na consciência.	1	2	3	4	5
13	Devido ao meu peso, a minha autoestima não é a que deveria ser.	1	2	3	4	5
14	Devido ao meu peso, sinto-me inseguro/a de mim mesmo.	1	2	3	4	5
15	Devido ao meu peso, não gosto de mim.	1	2	3	4	5
16	Devido ao meu peso, tenho medo de ser rejeitado/a.	1	2	3	4	5
17	Devido ao meu peso, evito olhar para espelhos ou ver fotografias minhas.	1	2	3	4	5

18	Devido ao meu peso, sinto vergonha de ser visto/a em lugares públicos.	1	2	3	4	5

Vida sexual		SEMPRE VERDADE	GERALMENTE VERDADE	ALGUMAS VEZES VERDADE	RARAMENTE VERDADE	NUNCA VERDADE
19	Devido ao meu peso, não sinto prazer em atividades sexuais.	1	2	3	4	5
20	Devido ao meu peso, sinto pouco ou nenhum desejo sexual.	1	2	3	4	5
21	Devido ao meu peso, tenho dificuldade no desempenho sexual.	1	2	3	4	5
22	Devido ao meu peso, evito encontros sexuais sempre que possível.	1	2	3	4	5

Constrangimento em público		SEMPRE VERDADE	GERALMENTE VERDADE	ALGUMAS VEZES VERDADE	RARAMENTE VERDADE	NUNCA VERDADE
23	Devido ao meu peso, sou ridicularizado/a, gozado/a, ou recebo atenção indesejada.	1	2	3	4	5
24	Devido ao meu peso, preocupo-me se vou caber ou não em assentos em lugares públicos (por exemplo, cinemas e teatros, restaurantes, carros ou aviões).	1	2	3	4	5
25	Devido ao meu peso, preocupo-me se vou conseguir passar em corredores estreitos, esquinas e portas giratórias.	1	2	3	4	5
26	Devido ao meu peso, procuro escolher cadeiras suficientemente fortes para aguentarem o meu peso.	1	2	3	4	5
27	Devido ao meu peso, sinto-me discriminado/a pelos outros.	1	2	3	4	5

Trabalho (Obs.: Para donas de casa e reformados/as, responda em relação às suas atividades diárias).		SEMPRE VERDADE	GERALMENTE VERDADE	ALGUMAS VEZES VERDADE	RARAMENTE VERDADE	NUNCA VERDADE
28	Devido ao meu peso, tenho dificuldade em desempenhar as minhas tarefas ou em cumprir as minhas obrigações.	1	2	3	4	5
29	Devido ao meu peso, sou menos produtivo/a do que poderia ser.	1	2	3	4	5
30	Devido ao meu peso, não recebo aumentos, promoções ou reconhecimento no trabalho.	1	2	3	4	5
31	Devido ao meu peso, receio ir a entrevistas para um emprego.	1	2	3	4	5

Three-Factor Eating Questionnaire

Questionário de Comportamento Alimentar

PARTE I: A seguir encontra várias afirmações seguidas de quatro letras. Assinale com um círculo a letra que melhor traduz a sua forma de pensar.

Se: Concorda totalmente assinale A;
Concorda na maior parte marque B;
Discorda na maior parte marque C;
Discorda totalmente marque D.

	Concordo totalmente	Concordo na maior parte	Discordo na maior parte	Discordo totalmente
1. Quando sinto o aroma de um alimento saboroso, ou vejo um alimento com aspecto delicioso, tenho dificuldade em evitar comê-lo mesmo que tenha acabado de fazer uma refeição	A	B	C	D
2. Em ocasiões sociais, como por exemplo festas, geralmente como demais	A	B	C	D
3. Tenho normalmente tanta fome que como mais do que três refeições por dia	A	B	C	D
4. Quando já comi o que penso ser a minha "dose" certa de calorias, geralmente consigo parar de comer	A	B	C	D
5. É muito difícil para mim fazer dieta porque fico com muita fome	A	B	C	D
6. Como deliberadamente pequenas porções de comida como forma de controlar o peso	A	B	C	D
7. Às vezes os alimentos sabem tão bem que continuo a comê-los mesmo quando já não tenho fome	A	B	C	D
8. Uma vez que sinto fome, gostava que um nutricionista me dissesse, enquanto estou a comer, se já comi o suficiente ou se podia comer mais um pouco	A	B	C	D
9. Dou por mim a comer quando me sinto ansioso	A	B	C	D
10. A vida é demasiado curta para me preocupa com dietas	A	B	C	D
11. Uma vez que o meu peso sobe e desce, por vezes faço dieta	A	B	C	D
12. Às vezes sinto tanta fome que tenho logo que comer qualquer coisa	A	B	C	D
13. Quando estou com alguém que come demasiadamente geralmente também como excessivamente	A	B	C	D
14. Tenho uma boa noção das calorias existentes nos alimentos comuns	A	B	C	D

15. Às vezes quando começo a comer, parece que não consigo parar	A	B	C	D
16. Não me é difícil deixar comida no prato	A	B	C	D
17. A certas horas do dia sinto fome porque me habituei a comer	A	B	C	D
18. Quando faço dieta e como um alimento que não é permitido, durante um certo período de tempo como menos para compensar	A	B	C	D
19. Estar com alguém que está a comer deixa-me muitas vezes com fome suficiente para comer também	A	B	C	D
20. Quando me sinto deprimido geralmente como excessivamente	A	B	C	D
21. Gosto demasiado de comer, para estragar tudo a contar calorias ou a controlar o peso	A	B	C	D
22. Quando vejo um alimento muito apetitoso geralmente fico com tanta fome que tenho que comer	A	B	C	D
23. Geralmente paro de comer quando ainda não estou realmente ”cheio”, como forma consciente de limitar a quantidade do que como	A	B	C	D
24. Fico tão esfomeado que o meu estômago parece muitas vezes estar sempre vazio	A	B	C	D
25. O meu peso raramente variou nos últimos anos	A	B	C	D
26. Sinto-me sempre de tal maneira esfomeado, que me é muito difícil parar de comer antes de acabar tudo o que tenho prato	A	B	C	D
27. Quando me sinto só consolo-me a comer	A	B	C	D
28. Contenho-me no que como para não ganhar peso	A	B	C	D
29. Às vezes, ao fim da tarde ou durante a noite, fico com muita fome	A	B	C	D
30. Como tudo o que quero e sempre que me apetece	A	B	C	D
31. Mesmo sem pensar nisso, demoro muito tempo a comer	A	B	C	D
32. Calculo as calorias dos alimentos que ingiro de forma a controlar o meu peso	A	B	C	D
33. Não como certos alimentos porque me fazem engordar	A	B	C	D
34. Tenho sempre fome suficiente para comer a qualquer momento	A	B	C	D
35. Presto muita atenção a eventuais modificações do meu corpo	A	B	C	D

36. Quando estou a fazer dieta, se como um alimento que não é permitido, acabo depois por comer ainda mais e ingerir alimentos muito calóricos	A	B	C	D

PARTE II: Cada questão nesta secção é seguida por um número de opções de resposta. Depois de ler cada questão cuidadosamente, escolha a opção que melhor se aplica a si e coloque um círculo no número apropriado.

37. Qual a frequência com que faz dieta, como forma de controlar o seu peso?

1	2	3	4
Raramente	Às vezes	Frequentemente	Sempre

38. Uma flutuação de peso de 2 a 2,5 quilos afectaria a sua alimentação?

1	2	3	4
Nada	Um pouco	Moderadamente	Muito

39. Com que frequência sente fome?

1	2	3	4
Só às refeições	Às refeições e, por vezes, entre as refeições	Às refeições e, frequentemente, entre as refeições	Quase sempre

40. Os sentimentos de culpa que sente quando come demais ajudam-no/a a limitar a ingestão de alimentos?

1	2	3	4
Nunca	Raramente	Geralmente	Sempre

41. Que dificuldade teria se parasse de comer a meio de um jantar e tivesse que se manter sem comer nas 4 horas seguintes?

1	2	3	4
Fácil	Ligeiramente difícil	Razoavelmente difícil	Muito difícil

42. Quanto consciente está daquilo que come?

1	2	3	4
Nada	Pouco	Moderadamente	Extremamente

43. Com que frequência evita abastecer-se de alimentos que acha tentadores mas demasiado calóricos?

1	2	3	4
Quase nunca	Às vezes	Geralmente	Quase sempre

44. Qual a probabilidade de comprar alimentos "light" ou de baixo valor calórico (iogurtes dietéticos tipo "Linha Zero", "Cola Diet", leite magro)?

1	2	3	4
Não é provável	Pouco provável	Moderadamente provável	Muito provável

45. Come de forma equilibrada na presença de outras pessoas e excessivamente quando está sozinho/a?

1	2	3	4
Nunca	Raramente	Geralmente	Sempre

46. Qual a probabilidade de intencionalmente comer devagar para diminuir a quantidade do que come?

1	2	3	4
Não é provável	Pouco provável	Moderadamente provável	Muito provável

47. Com que frequência não come sobremesa porque já não tem fome?

1	2	3	4
Menos do que 1 vez por mês	Pelo menos 1 vez por mês mas menos do que 1 vez por semana	Entre 1 e 3 vezes por semana	4 ou mais vezes por semana

48. Qual a probabilidade de conscientemente comer menos do que o que realmente gostaria de comer?

1	2	3	4
Não é provável	Pouco provável	Moderadamente provável	Muito provável

49. Tem episódios em que come excessivamente mesmo sem ter fome?

1	2	3	4
Nunca	Menos do que 1 vez por mês	Pelo menos 1 vez por mês mas menos do que 1 vez por semana	1 ou mais vezes por semana

50. Numa escala de 0 a 5, em que o significa não fazer qualquer restrição alimentar (comer o que quiser e quando quiser) e 5 traduz o máximo de restrição (limitar constantemente a ingestão de alimentos sem nunca ceder), que número traduziria o seu comportamento?

0. Come sempre o que quer e quando quer
1. A maior parte das vezes come o que quer e quando quer
2. Geralmente come o que quer e quando quer
3. Geralmente limita a ingestão mas às vezes come tudo o que lhe apetece
4. A maior parte das vezes limita a ingestão e raramente come tudo o que lhe apetece
5. Limita sempre a ingestão de alimentos e nunca come tudo o que lhe apetece

51. Em que medida a seguinte frase corresponde ao seu comportamento alimentar: "Começo a fazer dieta de manhã, mas porque acontecem tantas coisas durante o dia, quando chego à noite já desisti e como aquilo que quero, prometendo a mim mesmo iniciar a dieta no dia seguinte".

1	2	3	4
Não sou nada assim	Normalmente não sou assim	Uma descrição razoável do meu comportamento	Descreve-me na perfeição

52. Se comi um bocadinho mais num dia, compenso isso no dia seguinte.	V	F
53. Ingiro alimentos para emagrecer, mesmo que não tenham um sabor muito bom.	V	F
54. Fazer uma dieta para eu perder peso seria muito maçador.	V	F
55. Apesar de prestar muita atenção à minha figura, posso ter prazer com a variedade dos alimentos.	V	F
56. Prefiro saltar uma rejeição do que parar de comer depois de já ter ingerido metade da refeição.	V	F
57. Alterno entre momentos em que estou estritamente a fazer dieta e momentos em que não presto muita atenção ao que como e à quantidade que ingiro.	V	F
58. Às vezes salto refeições para evitar ganhar peso.	V	F
59. Estou a evitar certos alimentos, por norma, mesmo apesar de gostar deles.	V	F
60. Enquanto perco peso, tento aderir a um plano.	V	F
61. Geralmente prefiro alimentos "light" que não fazem engordar.	V	F
62. Se comi um bocadinho a mais numa refeição, compenso isso na refeição seguinte.	V	F
63. Sem um plano de dieta, nem saberia como controlar o meu peso.	V	F
64. O sucesso rápido durante uma dieta é muito importante para mim.	V	F

65. Costuma restringir deliberadamente o que come nas refeições apesar de lhe apetecer comer mais?

1	2	3	4
Sempre	Muitas Vezes	Raramente	Nunca

7-Day Physical Activity Recall

Questionário de Atividade Física dos últimos 7 dias

1. **Dia da semana** a que se refere o questionário: _____

2. Gostaria que se lembrasse de **todas as atividades físicas** que fez nos últimos 7 dias (o último dia recordado será ontem). Indique se em cada um dos 7 dias, realizou atividade física e que atividades fez. Só estamos interessados em atividades físicas de intensidade moderada ou superior (atividades intensas).

Atividades moderadas são as que fazem aquecer o seu corpo e até suar um pouco (num dia de temperatura normal) e que aceleram a sua frequência cardíaca e a sua respiração mais do que o normal. O melhor exemplo de uma atividade física de intensidade moderada é uma caminhada a um passo rápido. Alguns trabalhos de jardinagem mais ativos e alguns trabalhos domésticos (p.ex., aspirar ou lavar janelas), se executados de forma contínua e acelerada, podem também fazer elevar a sua respiração e calor corporal e ser considerados atividades físicas moderadas. Nestas atividades, ainda consegue conversar de forma relativamente normal.

Atividades intensas são as que tornam a sua respiração claramente mais frequente e aumentam muito a sua frequência cardíaca, tais como uma corrida ou uma aula de ginástica aeróbica. Se já não consegue conversar normalmente durante uma certa atividade, está por certo a fazer uma atividade física intensa.

Indique apenas **atividades que tenham durado 10 minutos ou mais**. Está pronta? Vamos então pensar na última semana... *(passar para a página seguinte)*

3. Esta semana foi **típica** em termos do seu padrão habitual de atividade ou exercício? Sim ☐ Não ☐ Se **não**, explique de forma breve:

_____

Se **não**, foi mais ou menos ativa do que costuma ser? Mais ☐ Menos ☐

- Se faz **mais** atividade que o normal, gostaria que me indicasse quais as atividades que acabou de me listar que foram **a mais** do que é o habitual... *(indicar estas atividades no quadro com a codificação* ***NHE***$^{+}$*, utilizando caneta vermelha)*

- Se fez **menos** atividade que o normal, gostaria que me descrevesse agora as atividades físicas que **faz habitualmente** (últimos 3 meses aproximadamente) mas que não efetuou a semana passada... *(indicar estas atividades no quadro com a codificação* ***HNE***$^{-}$*, utilizando caneta vermelha)*

Até agora, temos falado apenas dos últimos sete dias. Agora gostaria que pensasse nas suas atividades habituais nos últimos três meses.

4. Quantos **lances de escadas** sobe por dia? (1 lance = 10 degraus aproximadamente) _____ número de lances

5. Costuma realizar regularmente **exercícios de força e flexibilidade**, tais como agachamentos, flexões de braços, "abdominais", yoga ou alongamentos?

Não ☐ Sim ☐ Se sim, quantos dias por semana realiza estes exercícios? _____ número de dias (0-7)

6. Nos dias em que realiza exercícios de **força e flexibilidade**, durante quantos minutos os executa? _____ minutos/semana (total)

	Uma semana atrás						**Ontem**
	dia da semana	dia da semana	dia da semana	dia da semana	dia da semana	dia da semana	dia da semana
Dormir	HRS MIN ---------- :	HRS MIN ---------- :	HRS MIN ---------- :	HRS MIN ---------- :	HRS MIN ---------- :	HRS MIN ---------- :	HRS MIN ---------- :
	descrição duração :	descrição duração :	descrição duração :	descrição duração :	descrição duração :	descrição duração :	descrição duração :
	:	:	:	:	:	:	:
	:	:	:	:	:	:	:
	:	:	:	:	:	:	:
AF Habitual Não Efectuada (HNE-)	:	:	:	:	:	:	:

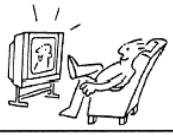
Lifestyle Physical Activity Index

Índice de Atividade Física do Estilo de Vida

O quadro seguinte indica várias atividades do dia-a-dia. Cada retângulo pretende representar um conjunto de atividades com a mesma intensidade (e não apenas aquela que está desenhada). **Para cada grupo (de A até I), indique quantas horas e minutos passa, num dia típico, nesse tipo de atividades.** Use a **última semana** como referência para um dia típico.

Se passa **menos de 10 minutos** por dia num tipo de atividades, **não coloque nada** nesse grupo. **Arredonde** sempre os minutos para a opção mais próxima que está disponível (p.ex., se passa 20 minutos numa atividade, escolha 15 minutos). Se faz **várias atividades** do mesmo grupo num dia típico (p.ex., do grupo C, pode sentar-se para trabalhar, para comer refeições, para escrever, etc.) **faça a soma do tempo** nessas atividades e escreva esse número (a soma).

Se faz atividades que não se encontram listadas, escolha a mais parecida. Se não tem a certeza, **escolha sempre a hipótese que lhe parecer melhor**. Lembre-se que a soma de todas as atividades **deve completar 24 horas**. Utilize um lápis e borracha para poder apagar/corrigir.

	Examples	Minutes	Hours	Time:
A	 Dormir, repousar.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
B	 Sentado/a sossegadamente a ver televisão, ouvir música ou ler.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
C	 A trabalhar no computador ou secretária, sentado/a numa reunião, refeições.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
D	 De pé, a lavar loiça ou a cozinhar, conduzir o carro	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
E	 Limpezas leves, varrer o chão, dançar devagar ou descer escadas.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
F	 Caminhar em passo rápido, andar de bicicleta, pintar paredes ou outras superfícies.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
G	 Subir escadas carregando objetos leves, jardinagem, carregar ou empilhar lenha.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
H	 Aeróbica, exercícios no ginásio, cortar lenha, praticar desportos.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	
I	 Mais esforço que o nível H: correr, corridas de bicicleta, jogar futebol ou andebol.	☐ ☐ ☐ 15 30 45	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10	

****A SOMA DE TODAS AS ACTIVIDADES DEVE COMPLETAR 24 HRS****
TOTAL _____
(confirme 24hr:0min)

As questões seguintes descrevem atividades do dia-a-dia. P.f. indique quantas vezes, **no último mês**, escolheu cada uma das atividades descritas.

1. **Subir escadas** em vez de utilizar elevadores ou escadas rolantes (p.ex. no seu prédio, em centros comerciais, no local de trabalho, etc.)

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

2. Escolher **estar em pé** em situações **em que podia estar sentado/a** (p.ex. em casa, enquanto fala ao telefone, enquanto espera em locais públicos, espera pelo transporte, etc.)

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

3. Escolher **caminhar** quando habitualmente costumava ir de carro ou transportes (p.ex. ir às compras, deslocar-se no bairro ou em percursos pequenos equivalentes a 5-10 min de carro, ir aos correios ou à farmácia, etc.)

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

4. **Estacionar o carro** num local **mais distante** da entrada (p.ex. centros comerciais, lojas, cinema, trabalho, etc.) para poder caminhar mais até à entrada

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

5. Escolher fazer **manualmente** o que antes fazia com auxílio de máquinas automáticas (p.ex. lavar o carro, lavar janelas, etc.)

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

6. Fazer pausas durante o **trabalho** ou utilizar os intervalos do trabalho para **caminhar ou movimentar-se mais** (p.ex. caminhar até o restaurante, caminhar para entregar uma mensagem ao colega de trabalho em vez de enviar via e-mail ou telefonar, escolher um WC mais distante do lugar onde trabalha em vez do mais próximo, etc.)

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

7. Escolher **caminhar** ou outra forma ativa quando é forçado/a a esperar em circunstâncias diárias (esperar por alguém, esperar para ser atendido, durante os anúncios da TV)

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

8. Existem **outras situações** em que escolhe ser **fisicamente mais ativo/a**, quando podia facilmente gastar menos energia? Se sim indique em baixo, p.f.

Descreva a situação: _____

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

Descreva a situação: _____

☐ Nunca ☐ Poucas vezes ☐ Algumas vezes ☐ Muitas vezes ☐ Sempre que possível

APPENDICES

Abstracts of oral/poster communications related to the thesis

Published abstracts

Santos I, Andrade AM, Teixeira PJ. (2013). Prevalence of weight control attempts and behavioral strategies among Portuguese adults: A national survey. Obesity Facts, 6(Suppl. 1): 191.

Introduction: In Portugal, there are no representative data on how many people are actively trying to lose (or avoid gaining) weight. This study evaluated, in a nationally representative sample, age- and gender-specific prevalence of attempts to lose/maintain weight, and weight control motives and behaviors.

Methods: Cross-sectional survey of a random sample of 1098 Portuguese adults (18-65y).

Demographic information and weight loss/weight maintenance motivations and behaviors were assessed by telephone questionnaire.

Results: The prevalence of attempting to lose or avoid gaining weight was 17.9% (18-40y: 20.3%; 41-65y:15.2%) and 16.8% (18-40y:15.5%; 41-65y:18.2%) among men and 31.1% (18-40y:26.3%; 41-65y:36.0%) and 22.1% (18-40y:22.9%; 41-65y:21.3%) among women, respectively. The most frequently adopted strategies to control weight among men and women were eating vegetables (86.2%) and soup (71.8%) regularly and drinking water instead of other beverages (76.4%). In both genders, key strategies to lose were similar to those used to maintain weight. In women, but not in men, weight loss attempts were significantly more associated with consulting with weight loss experts and taking drugs/supplements (compared to weight maintenance strategies). The most prevalent motives to control weight were to improve health and prevent disease, to improve appearance, and to preserve self-esteem (>80%).

Conclusion: This study indicates that nearly one in every two adults in Portugal is currently trying to control weight. Importantly, weight maintenance behaviors appear not to differ markedly from weight loss strategies in both genders. Weight control motivations that involve appearance and self-esteem are highly prevalent, which could influence normative well-being and help shape obesity interventions.

Santos I, Andrade AM, Teixeira PJ. (2013). Controlo do peso em Portugal: prevalência e estratégias comportamentais. Revista Portuguesa de Cirurgia, Suppl: 42.

Introdução: O presente estudo teve como objectivo determinar, numa amostra representativa da população adulta portuguesa, a prevalência das tentativas de perda e manutenção do peso e descrever as estratégias comportamentais, no âmbito da alimentação e da atividade física, que levam ao controlo do peso com sucesso.

Métodos: Estudo transversal constituído por uma amostra de 1098 adultos portugueses com idades compreendidas entre os 18 e os 65 anos. A informação sociodemográfica, as estratégias utilizadas para a perda e manutenção do peso e a história do peso foram recolhidos por entrevista telefónica.

Resultados: A prevalência das tentativas de controlo do peso foi de 34,7% nos homens (17,9% a tentar perder e 16,8% a evitar aumentar) e 53,2% nas mulheres (31,1% a tentar perder e 22,1% a evitar aumentar). As tentativas de perda e manutenção do peso foram menos comuns ($p<0.001$) entre as pessoas com peso normal (IMC < 25kg/m^2 – 38,7%) do que entre pessoas com pré-obesidade (IMC ≥ 25 até 29,9kg/m^2 – 53,3%) ou obesidade (IMC ≥ 30kg/m^2 – 62,7%). As estratégias mais frequentemente adoptadas para controlar o peso em homens e mulheres foram consumir vegetais (86,2%) e sopa (71,8%) regularmente e optar por água em detrimento de outras bebidas (76,4%). Algumas estratégias potencialmente prejudiciais para a saúde como induzir o vómito ou jejum prolongado, fazer dietas "da moda" e recorrer ao uso de laxantes ou diuréticos foram utilizadas por 4%, 4,1% e 8,7% das pessoas, respectivamente.

Conclusões: Este estudo indica que cerca de 44% dos adultos portugueses estão a tentar controlar o peso. Conclui-se também que as estratégias comportamentais mais utilizadas para manter o peso parecem não ser diferentes das mais utilizadas para perder peso e são consistentes com as recomendações de saúde pública.

Santos I, Mata J, Carraça EV, Silva MN, Sardinha LB, Teixeira PJ. (2014). Three-year weight management in overweight women: A signal detection analysis of behavioral and psychological predictors. Obesity Facts, 7(Suppl. 1):134.

Introduction: Identifying predictors of successful weight management is essential for improving obesity interventions. This study examined behavioural and psychological predictors of 3-year weight loss maintenance in overweight women.

Methods: 154 overweight women (age: 38.7 ± 6.6 years; BMI: 29.7 ± 4.2 kg/m^2) engaged in a 1-year behavioural weight management intervention with a 2-year follow-up (RCT). Signal detection analyses were used to identify predictors of 3% and 5% weight loss maintenance.

Results: Perceived barriers for exercise best differentiated the successful and non-successful 3% weight loss maintainers. Of those with low barriers for exercise, 58% achieved at least 3% weight loss maintenance (vs. 27% of women with higher barriers). Still, among women with higher barriers, those with a high quality of life were significantly more likely to achieve 3% weight loss maintenance (63% vs. 17% success in women with low quality of life). Self-ideal body image discrepancy best distinguished successful 5% weight loss maintainers from non-maintainers. Of those with a more positive body image, 54% met the 5% weight loss maintenance criterion (vs. 23% in women with poorer body image). In women with poorer body image, having high exercise intrinsic motivation was somewhat compensatory for high body image discrepancy and increased the likelihood of achieving 5% weight loss maintenance (41% vs. 10% success in women with low intrinsic motivation).

Conclusion: During treatment, reducing perceived barriers for exercise, improving body image, and increasing quality of life and exercise intrinsic motivation likely results in enhanced long-term weight management in overweight women.

Other communications

Santos I, Vieira P, Teixeira PJ. (2012). Perder e manter o peso em Portugal: Ingestão alimentar e atividade física no Registo Nacional de Controlo do Peso. Congresso Português de Dietética e Nutrição, Lisboa, Portugal.

Objectivos: O presente estudo tem como objectivos descrever características da ingestão alimentar e atividade física de participantes no Registo Nacional de Controlo do Peso (RNCP), e identificar estratégias utilizadas para a perda de peso e sua manutenção a longo prazo.

Métodos: Foram avaliados 154 adultos (idade: 39,7 ± 10,7 anos; IMC: 26,7 ± 4,3 kg/m^2), dos quais 94 (61%) eram mulheres. Os indivíduos apresentaram uma perda de peso média de 17,2 ± 10,5 kg, tendo mantido o peso perdido durante ≈33 meses. Os participantes completaram um questionário inicial que incluía variáveis demográficas, detalhes sobre a história do peso e estratégias de perda e manutenção do peso. Em laboratório, avaliou-se o peso, estatura e perímetro de cintura, a ingestão alimentar e a atividade física dos participantes.

Resultados: Os participantes reportaram uma ingestão média de 2160 kcal/dia (19% proteínas, 48% hidratos de carbono e 33% gordura). As estratégias mais utilizadas para atingirem a perda/manutenção de peso foram a ingestão de pequeno-almoço e o consumo de produtos hortícolas e, em média, os participantes faziam 5 refeições por dia e comiam 3 vezes por semana em restaurantes. A maioria dos indivíduos (83%) reportou níveis elevados de atividade física por semana (Dispêndio Energético = 1500kcal/semana), tendo praticado, em média, 38 minutos por dia de atividade física moderada e vigorosa.

Conclusões: Os dados do RNCP sugerem que um número considerável de indivíduos em Portugal tem sucesso na manutenção do peso perdido a longo prazo e que o faz através da adopção de determinadas estratégias no âmbito da alimentação e da atividade física, que serão discutidas. Um maior número de participantes no Registo vai permitir conhecer com mais detalhe a realidade portuguesa no que respeita às características e estratégias de perda/manutenção de peso e identificar possíveis variáveis preditoras da gestão bem sucedida do peso a longo prazo.

Santos I, Ball K, Teixeira PJ, Crawford DA. (2013). Cross-sectional and longitudinal associations between physical activity motivation and physical activity behavior in women. 12th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Ghent, Belgium.

Purpose: To analyze, on the basis of self-determination theory, cross-sectional and longitudinal associations between qualitative features of physical activity motivation and physical activity in women living in socioeconomic disadvantage.

Methods: The present study used data collected in 2007-08 (baseline) and 2011 (three-year follow-up) as part of the Resilience for Eating and Activity Despite Inequality study. A total sample of 1664 women aged 18-45 years was analyzed. In mail-based surveys, women reported sociodemographic characteristics, neighborhood environmental characteristics (hypothesized to influence obesity risk), motivation (intrinsic motivation and identified regulation) and goals (health/fitness, appearance/weight and relaxation/stress relief) related to physical activity behavior, weight control intentions and leisure-time physical activity. Linear regression models were used to assess the association between motivational variables and leisure-time physical activity, and moderator effects of weight control intentions were examined.

Results: Intrinsic motivation and, to a lower extent, health/fitness, appearance/weight and relaxation/stress relief reasons to be active were consistently associated with leisure-time physical activity at baseline and follow-up. Moderated regression analyses revealed that appearance/weight reasons were significantly associated with leisure-time physical activity at baseline (β=0.097; p=0.011) and intrinsic motivation was significantly associated with leisure-time physical activity at follow-up (β=0.165; p<0.001) for women actively trying to control their weight.

Conclusions: Results suggest that, especially in women trying to lose or maintain weight, reasons related to appearance/weight and intrinsic motivation (including affective and experiential elements), predict physical activity behavior, controlling for several key environmental factors. Findings are also consistent with an important role of intrinsic motivation in sustaining physical activity participation over time.

Santos I, Mata J, Silva MN, Sardinha LB, Teixeira PJ. (2014). Predicting long-term weight loss maintenance in overweight women: Post-treatment profiles based on a signal detection approach. 13th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, San Diego, California.

Purpose: To examine behavioral and psychological predictors of 24-month weight loss maintenance in overweight women involved in a lifestyle weight control intervention.

Methods: Participants were 154 overweight women (age: 38.7 ± 6.6 years; BMI: 29.7 ± 4.2 kg/m^2) involved in a 12-month behavioral weight management intervention with a 24-month follow-up. Signal detection analyses were used to identify characteristics at the end of the intervention that best predicted 5% weight loss maintenance at 24 months post-intervention. Descriptive profiles of each identified success-group were examined.

Results: Self-ideal body size discrepancy best differentiated the high- and low-success-group in maintaining weight loss at 24-month follow-up. Of those with low self-ideal discrepancy, 54% met the 24-month 5% weight loss maintenance criterion (vs. 23% in women with poorer body image). Among women with poorer body image, having high exercise intrinsic motivation compensated somewhat for body image (11% were successful weight loss maintainers). Only 4% of women with high discrepancy and low intrinsic motivation met this criterion. Descriptively, the most successful group showed larger weight loss (-6.0±4.9kg), higher autonomous motivation (47.7±8.1), exercise self-efficacy (39.6±6.3), flexible eating restraint (6.1±1.0), body attractiveness (13.7±3.61) and physical self-worth (14.6±3.9) and lower exercise perceived barriers (25.5±7.4), and impact of weight on quality of life (41.5±9.8), at intervention's end (all $p<0.05$), compared to the least successful group.

Conclusions: In overweight women, improving body image and increasing exercise intrinsic motivation during treatment is likely to result in enhanced long-term weight loss maintenance. Developing a flexible eating restraint pattern and improving exercise self-efficacy and quality of life may also contribute to lasting weight changes.

Santos I, Carraça EV, Marques M, Sniehotta F, Teixeira PJ. (2015). Prevalence and correlates of non-surgical weight control attempts in adults: a systematic review and meta-analysis. 14th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Edinburgh, Scotland.

Purpose: Understanding how many weight loss efforts are made, by whom, through what means, and how successful they are, provides critical knowledge to inform public health interventions. This review will seek to answer these questions by determining the prevalence of weight control attempts, identifying the related strategies and practices, and describing the reasons behind weight loss attempts among adult populations around the world.

Methods: Scientific articles were identified through electronic database searches (PubMed, PsycINFO and Web of Science) and also through manual cross-referencing of retrieved articles and hand-searches of key scientific journals. Search terms included attempts, weight control, weight loss, diet, prevalence, correlates, strategies, practices, reasons and determinants. Epidemiological/observational studies were eligible if they reported current weight control attempts in adults (18-65 yr).

Results: The search yielded 155 potentially relevant papers after title/abstract screening. After full-text screening, 51 studies met the eligibility criteria for entering the review. *The Joanna Briggs Institute data extraction form for prevalence and incidence studies* was used by the first two authors to extract relevant information, which will be included in summary tables. The same researchers are assessing study methodological quality using the *Joanna Briggs Institute critical appraisal checklist for studies reporting prevalence data*. Outcomes will be analyzed separately. Conclusions will be drawn based on a narrative synthesis of weight control attempts and related behaviors. If appropriate, meta-analytical techniques will be conducted.

Conclusions: Weight loss and/or preventing weight gain are a major concern for many people. As a result, systematically identifying and summarizing relevant information on weight control attempts and related behaviors across populations can contribute to more effective weight management practices, prevent psychological suffering associated with fruitless attempts, and allocate public health policies and resources more efficiently.

Santos I, Carraça EV, Marques M, Sniehotta F, Teixeira PJ. (2016). Weight control attempts in adults: a systematic-review and meta-analysis. 15th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Cape Town, South Africa.

Purpose: To summarize the available epidemiological data on the prevalence of weight loss and weight maintenance attempts among adults worldwide, and to provide a comprehensive description of the strategies used and the reasons behind these attempts.

Methods: Scientific articles were identified through electronic databases searches (e.g., PubMed) and reference scanning. Epidemiological/observational studies were eligible for inclusion if they reported current weight control attempts in samples of adults (≥18 years). The Joanna Briggs Institute data extraction form for prevalence and incidence studies was used to extract relevant information. Study methodological quality was assessed using a short version of The Joanna Briggs Institute critical appraisal checklist for studies reporting prevalence data.

Results: Fifty-three studies met eligibility criteria. Pooled estimates for the prevalence of weight loss and weight maintenance attempts were, respectively, 40.4% (Q=31320, p<0.001; I^2=99.8%) and 26.9% (Q=5709, p<0.001; I^2=99.8%). Analysis of only the last 15 years shows a prevalence of weight loss attempts of 46.9% (Q=11681, p<0.001; I^2=99.8%). Excluding studies with methodological limitations led to negligible changes in the overall prevalence estimates. There were significant differences between geographic regions (Q=11005, p=0.012), with the highest overall prevalence found in North America (43%) and the lowest in Europe (31.4%). Increases in the prevalence of weight loss attempts were associated with (1) the year of the survey (from 1975 to 2012; b=0.04, SE=0.005; z=7.964, p<0.001), (2) higher prevalence of overweight and obesity (b=0.01, SE=0.002; z=7.249, p<0.001), and (3) higher percentage of women in the samples (b=0.01, SE=0.003; z=2.266, p=0.02). Across studies, the most frequently used strategy for trying to control weight was "adopting a healthier diet". "To improve wellbeing" and "to improve general health" were the main reported reasons for trying to lose and maintain weight, respectively.

Conclusions: To our knowledge, this is the first systematic review to investigate weight control attempts worldwide. Key strategies and reasons associated with weight control

were identified, suggesting that these can be taken into account in future public health initiatives aiming to promote and support healthy weight control. In order to better capture prevalence shifts, surveillance systems with standardized instruments should be scheduled, to facilitate comparability of results.